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RADIOLOGICAL HEALTH DATA

MONTHLY REPORT

May 1960

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

Division of Radiological Health

PREFACE

In August 1959, the President directed the Secretary of Health, Education, and Welfare to intensify Departmental activities in the field of radiological health. The Department was assigned, among other things, primary responsibility within the Executive Branch for the collation, analysis, and interpretation of data on environmental radiation levels. Within the Department this responsibility has been delegated to the Division of Radiological Health, Public Health Service.

As a step in the discharge of this responsibility, the Public Health Service is issuing this monthly publication. The data have been submitted by agencies of the Federal government, by States, and by other sources. Each third report, starting July 1960, will contain interpretive statements as well as data.

The monthly and quarterly reports will be reviewed by a Board of Editorial Advisors with representatives from the following Federal agencies:

Department of Health, Education, and Welfare
Atomic Energy Commission
Department of Defense
Department of Commerce
Department of Agriculture

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SECTION I

MILK

PUBLIC HEALTH SERVICE MILK MONITORING PROGRAM

The Public Health Service Milk Monitoring Network presently consists of 12 sampling stations. This will be expanded to about 60 stations by the summer of 1960.

The initial purpose of establishing this network was in keeping with the normal and continuing program of the U.S. Department of Health, Education, and Welfare to determine trends in our changing environment, including measurement of amounts of radioactivity in water, air, milk, and other foods. Milk was the food chosen for initial testing since it is among the most important elements of the diet and is constantly available at all seasons of the year and in all climates. A primary objective of the project was to develop and simplify methods of collection and radiochemical analysis of milk to make them more suitable for larger scale programs.

The selection of the present 12 sampling stations was based on the following criteria:

1. The milk represented in each sample was from a group of farms milking a total of at least 1,000 cows.

2. The number of individual farms was small enough so that collection of collateral field data from each farm was feasible.

3. The milk samples were from a supply that was part of a metropolitan milkshed.

4. The conditions under which the milk was received were such that each sample was representative of the same farms in the production area.

The Overton, Nevada and St. George, Utah milksheds do not fulfill the 1,000 cow minimum requirement but have been included since they are part of the monitoring program around the Nevada Test Site.

One gallon samples are collected once each month and forwarded by air parcel post to the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, for radionuclide analysis. It is estimated that these samples represent 2,000 gallon lots. The concentration of iodine-131, barium-140, and cesium-137 and naturally occurring potassium-40 are all currently being measured when present in the milk by gamma scintillation spectroscopy. Total strontium and strontium-90 are determined following radiochemical separations, and the strontium-90 is calculated by measuring the build-up of the daughter decay product, yttrium-90 (after about a two week wait) using a low background anticoincidence beta counter. The total radioactive strontium is counted in a shielded internal proportional counter with the strontium-89 calculated as the difference.

Publication of the data will normally require a period of about three months after collection due to shipment, processing, decay product build-up, compilation of the data, and inclusion with other radiation data in the monthly reports.

A description of the program appears in "The Occurrence of Strontium-90, Iodine-131 and Other Radionuclides in Milk, May 1957 through April 1958," by J. E. Campbell, G. K. Murthy, A. S. Goldin, H. B. Robinson, C. P. Straub, F. J. Weber, and K. H. Lewis, American Journal of Public Health, Vol. 49, No. 2, February 1959, American Public Health Association, reprinted by the Joint Committee on Atomic Energy Hearings on Fallout from Nuclear Weapons Tests, Vol. 1, May 1959.

Detailed technical descriptions of the methodology of analyses are listed below:

"Determination of I-131, Cs-137 and Ba-140 in Fluid Milk by Gamma Spectroscopy." By G. R. Hagee, G. R. Karches and A. S. Goldin, Public Health Service.

"A Method for the Rapid Ashing of Milk for Radionuclide Analysis," Journal of Dairy Science, 42-1288, Aug. 1959. By G. K. Murthy, J. E. Campbell.

"A Method for the Determination of Radionuclides in Milk Ash," Journal of Dairy Science, 14 1276, Aug. 1959. By G. K. Murthy, L. P. Jarnagin, and A. S. Goldin.

"A Method for the Elimination of Ashing in Strontium-90 Determination of Milk," Journal of Dairy Science, 43 (2) 151, Feb. 1960. By. G. K. Murthy, J. E. Coakley and J. E. Campbell.

TABLE 1—PUBLIC HEALTH SERVICE DATA ON RADIOACTIVITY IN MILK

December 1959

Data from one sampling point supplying the cities listed below

Radioactivity in $\mu\mu$c/liter

Area	Calcium grams/liter		Iodine-131		Strontium-89		Strontium-90		Barium-140		Cesium-137	
	Dec.	Yearly average	Dec.	Yearly average	Dec.	Yearly average	Dec.	Yearly average	Dec.	Yearly average	Dec.	Yearly average
			(a)									
Atlanta, Ga.	1.18	1.18	0	3	5	46	14	15	0	<1	70	86
Austin, Tex.	1.16	1.13	0	2	0	23	7	6	0	<1	20	46
Chicago, Ill.	1.12	1.10	0	2	0	11	8	9	0	0	35	56
Cincinnati, Ohio	1.16	1.13	0	1	0	18	14	13	0	<1	35	49
Fargo, N. Dak. Moorhead, Minn.	1.14	1.12	0	2	0	16	16	14	0	<1	70	61
New York, N. Y.	1.08	1.08	0	2	0	9	9	9	0	<1	40	53
Overton, Nev. (b)	1.16	1.07	0	<1	0	2	3	3	0	0	20	30
Sacramento, Calif.	1.16	1.11	0	1	0	14	4	5	0	<1	10	44
Salt Lake City, Utah	1.15	1.12	0	2	0	8	6	7	0	<1	35	43
Spokane, Wash.	1.16	1.17	0	4	0	21	13	12	0	<1	85	71
St. George, Utah (c)	1.13	1.11	0	1	0	5	3	5	0	0	15	30
St. Louis, Mo.	1.26	1.25	0	1	6	62	22	22	0	2	45	80

(a) Zero means below detectability.
(b) Average includes 10 months from start of the regular monthly collections.
(c) Average includes 9 months from start of the regular monthly collections.

ATOMIC ENERGY COMMISSION DATA ON RADIOACTIVITY IN MILK (NOVEMBER 1959)

Routine milk monitoring is conducted at New York City, Perry, New York, and Mandan, North Dakota, with analyses performed at the Atomic Energy Commission's New York Health and Safety Laboratory. Data for these three locations for the month of November 1959 are presented below. Data for previous months were given in HASL-77, pp. 85-90,* and Radiological Health Data, April 1960.

TABLE II.—STRONTIUM-90 AND CALCIUM IN MILK (NOVEMBER 1959)

Health and Safety Laboratory (HASL) Sampling Locations

Sample location	grams Ca per		μμc strontium-90 per			Sr-89/Sr-90 at midpoint of sampling month
	liter	kg powder	liter	kg powder	g Ca	
Perry, N. Y. (Powdered whole milk)		9.01		63.2 ± 4.0	7.00 ± 0.43	1.0
New York City (Whole liquid milk)	1.09		11.3 ± 0.7		10.2 ± 0.6	0.6
Mandan, N. Dak. (Powdered buttermilk)		9.99		234 ± 9	23.5 ± 0.9	0.4

*Health and Safety Laboratory Strontium Program Quarterly Summary Report, January 1, 1960, available from the Office of Technical Services, Department of Commerce, Washington 25, D. C., for $3.50.

SECTION II

AIR

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

The Public Health Service Radiation Surveillance Network was established in 1956 in cooperation with the Atomic Energy Commission to provide a means of promptly determining increases in environmental radiation due to radioactive fallout during nuclear weapons tests. The program has proven sufficiently valuable that it has been extended to a round-the-year basis and currently consists of 44 stations at urban locations (see Fig. 1) operated by State and local health department personnel with 3 operated by U.S. Public Health Service personnel.

Measurements of gross beta radioactivity in air have been taken since they provide one of the earliest and most sensitive indications of increases of activity in the environment, and thus act as an "alert" system. These data alone are not conducive to evaluation directly of biological hazards. However, field measurements do enable the operator to estimate the amount of beta activity of particulates in the air at the station five hours after collection, by comparison to a known source, using a portable survey meter. The filters are then forwarded to the laboratory in Washington for a more refined measurement using a thin-window proportional counter.

Air samplers are in operation at the 44 stations on an average of 70% of the week. Air is drawn through a cellulose carbon loaded dust filter using a high volume air sampler. The radioactive material in fallout adhering to small dust-like particles is retained on the filter. Some gaseous fission products are adsorbed by the carbon. The contribution by gaseous fission products has represented only a small part of the total beta activity in these samples.

About 85% of the stations collect samples of precipitation which are sent to Washington for analysis. Values are now below limits of detection by present instrumentation. New equipment is being procured to measure lower values. Measurements have indicated that the bulk of deposited activity occurs through precipitation but concentrations in surface air are not directly relatable to the amount deposited through precipitation.

External gamma measurements are also made at each station (see Section IV).

More detailed data from this surveillance network are released monthly by the U. S. Public Health Service. A description of the program is printed in the Hearings on Radioactive Fallout held by the Joint Committee on Atomic Energy in May 1957, Vol. 1, page 459.

FIGURE 1

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

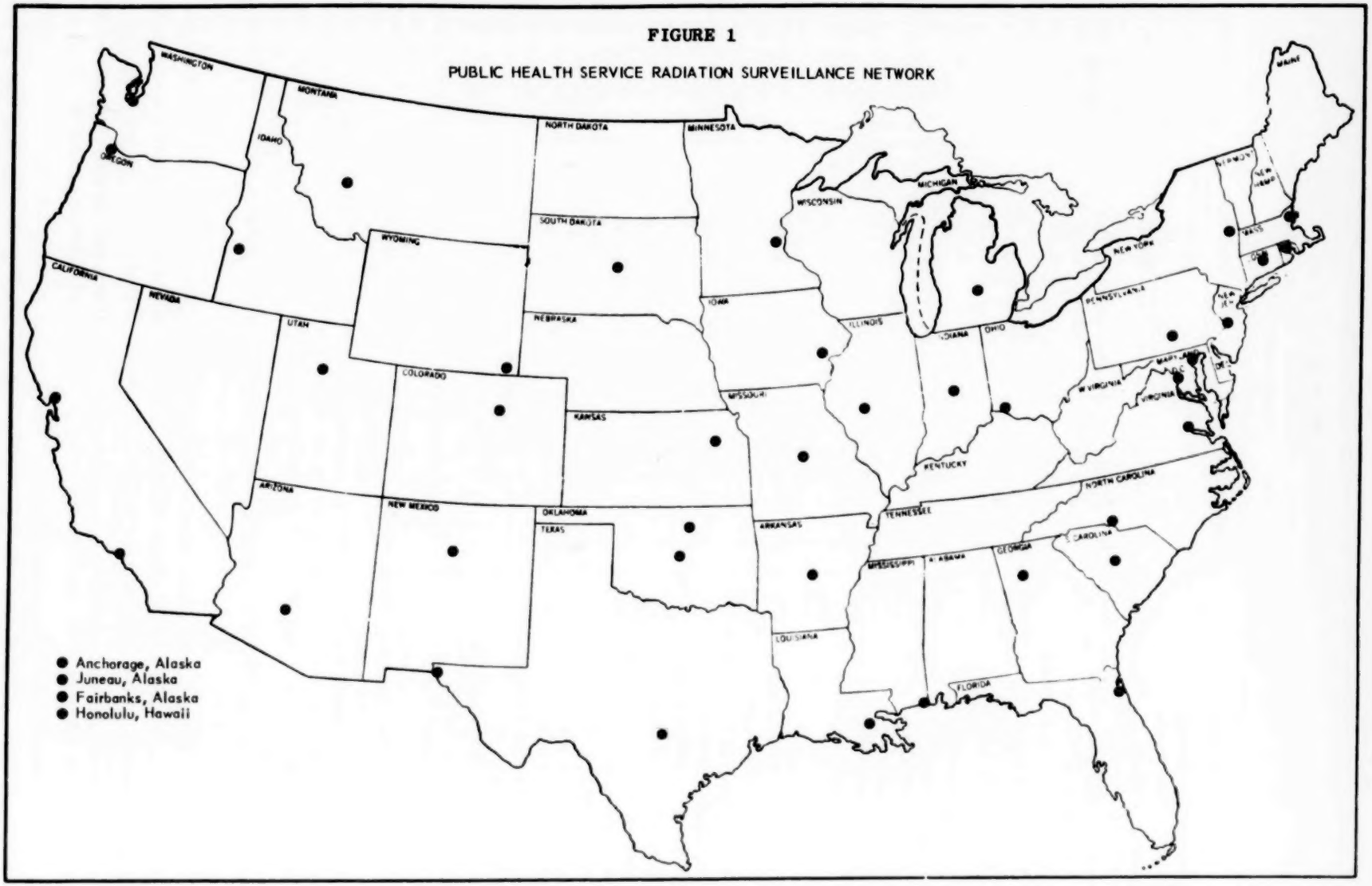


TABLE III.—PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

Radioactivity of Particulates in Air
Micromicrocuries Per Cubic Meter—Gross Beta Counts
For Month of December 1959

Station location	Weighted average	Maximum	Minimum
Alaska, Anchorage	< 0.11	0.18	< 0.10
Alaska, Fairbanks	< 0.12	0.19	< 0.10
Alaska, Juneau	< 0.10	0.11	< 0.10
Arizona, Phoenix	< 0.14	0.20	< 0.10
Arkansas, Little Rock	< 0.11	0.16	< 0.10
California, Berkeley	< 0.16	0.25	< 0.10
California, Los Angeles	< 0.20	0.54	< 0.10
Colorado, Denver	< 0.18	0.26	< 0.10
Connecticut, Hartford	< 0.11	0.15	< 0.10
District of Columbia	< 0.14	0.24	< 0.10
Florida, Jacksonville	< 0.13	0.26	< 0.10
Georgia, Atlanta	< 0.16	0.26	< 0.10
Hawaii, Honolulu	< 0.10	0.12	< 0.10
Idaho, Boise	-	-	-
Illinois, Springfield	< 0.11	0.16	< 0.10
Indiana, Indianapolis	< 0.12	0.17	< 0.10
Iowa, Iowa City	< 0.11	0.15	< 0.10
Kansas, Topeka	< 0.12	0.17	< 0.10
Louisiana, New Orleans	0.15	0.26	0.10
Maryland, Baltimore	< 0.11	0.18	< 0.10
Massachusetts, Lawrence	< 0.11	0.15	< 0.10
Michigan, Lansing	< 0.11	0.14	< 0.10
Minnesota, Minneapolis	< 0.10	0.14	< 0.10
Mississippi, Pascagoula	0.23	0.39	0.11
Missouri, Jefferson City	< 0.13	0.19	< 0.10
Montana, Helena	< 0.14	0.26	< 0.10
New Jersey, Trenton	< 0.10	< 0.10	< 0.10
New Mexico, Santa Fe	< 0.14	0.25	< 0.10
New York, Albany	< 0.11	0.16	< 0.10
North Carolina, Gastonia	< 0.15	0.25	< 0.10
Ohio, Cincinnati	0.43	1.80	0.00
Oklahoma, Oklahoma City	< 0.13	0.21	< 0.10
Oklahoma, Ponca City	< 0.10	< 0.10	< 0.10
Oregon, Portland	< 0.13	0.21	< 0.10
Pennsylvania, Harrisburg	< 0.13	0.27	< 0.10
Rhode Island, Providence	< 0.11	0.18	< 0.10
South Carolina, Columbia	< 0.13	0.19	< 0.10
South Dakota, Pierre	< 0.13	0.18	< 0.10
Texas, Austin	< 0.15	0.20	< 0.10
Texas, El Paso	< 0.21	0.44	< 0.10
Utah, Salt Lake City	< 0.12	0.23	< 0.10
Virginia, Richmond	< 0.11	0.18	< 0.10
Washington, Seattle	< 0.10	0.14	< 0.10
Wyoming, Cheyenne	< 0.14	0.26	< 0.10

It has been noted recently that values for beta activities in air in Cincinnati are somewhat higher than in other stations in the Radiation Surveillance Network. Reasons may be:

1. Cincinnati uses a membrane type filter with a 20 liters per minute flow rate, compared to a cellulose type filter at other stations sampling 1500 liters per minute.

2. Variations in counting equipment.

3. Samples are counted at Cincinnati within one day after collection, whereas the samples from other stations are counted several days later in Washington. Thus, Cincinnati values may incorporate natural beta activity from thoron daughters.

Although the relative contribution from each of these parameters has yet to be evaluated, it is recognized that some of them probably play a much more significant role than others.

TABLE IV.--RADON AND THORON AIR MEASUREMENTS

December 1-31, 1959
Cincinnati, Ohio

RADIATION SURVEILLANCE NETWORK

(Beta Activity Included)

Date	Continuous sample collection			Beta (a) activity $\mu\mu c/m^3$	Radon (b) AM $\mu\mu c/m^3$	Radon (c) PM $\mu\mu c/m^3$	Thoron (d) $\mu\mu c/m^3$
	Sample change time	Sampling period (hours)	Volume m^3				
Dec. 1	0804	23.9	28.2	0.5	166	157	1.1
2	0806	23.9	27.7	1.1	468	169	3.1
3	0810	24.0	27.4	1.0	459	189	2.5
4	0804	23.8	27.4	0.2	334	125	2.2
7	0806	71.9	82.8	0.3(3)	110	69	1.4
8	0806	23.9	23.7	0.4	170	191	1.1
9	0804	22.9	23.9	1.8	607	201	4.3
10	0804	23.9	21.9	1.6	921	186	4.5
11	0806	23.9	21.7	0	400	98	2.4
14	0808	71.9	64.7	0.3(3)	140	113	2.4
15	0804	23.8	26.7	0.6	238	154	1.6
16	0804	23.9	27.1	0.7	252	98	1.6
17	0804	23.9	27.0	0.7	307	208	1.7
18	0804	23.9	27.4	0.3	229	76	1.5
21	0804	71.9	82.0	0.2(3)	154	152	1.5
22	0804	23.9	27.1	0.6	306	72	1.8
23	0804	23.9	27.2	0	130	182	1.1
24	0804	23.8	27.1	0.2	346	-	-
28	0804	95.8	110.4	0.2(4)	98	114	1.1
29	0804	23.9	26.8	0.2	142	151	0.5
30	0804	23.9	26.2	0.2	74	51	0.5
31	0804	23.9	27.1	0.1	84	51	0.6
Average.....				0.43	278	138	1.9

(a) Gross beta activity when counted one day after end of sampling or later as indicated by numeral in parenthesis.

(b) Measured within a few minutes of removal of filter from sampler and corrected back to collection time (uncorrected for thoron daughter interference).

(c) Filters are temporarily withdrawn from sampler at about 3 PM and counted. (Values are corrected back to removal time.) The filters are then replaced on sampler to complete the sampling period of about 24 hours. Thus, the values in this column are from the same filters that are counted at about 8 AM the following day.

(d) Thoron from alpha activity of filter sample counted 7 hours after taking a 24-96 hour sample.

U.S. NAVAL RESEARCH LABORATORY DATA ON RADIOACTIVITY IN AIR (DECEMBER 1959 AND JANUARY 1960)

Radioactivity measurements of air-filter samples collected at various sites along the 80th Meridian (west) are made by the U.S. Naval Research Laboratory under a program partially financed by the Atomic Energy Commission.

The daily record of fission product beta activity during December 1959 and January 1960 is shown in Table V and Table VI, respectively. The radioactivity profiles for December 1959 and January 1960 are shown in Figure 2 and Figure 3. All radioactivity concentrations are given in disintegrations per minute per cubic meter of air at the collecting site.

The low activity levels presently being encountered throughout this network necessitated that samples from several sites (Porto Alegre, San Juan, and Columbia, S.C.) be omitted from radioactivity assay because of insufficient counting capacity.

TABLE V.—U. S. NAVAL RESEARCH LABORATORY DAILY RECORD OF FISSION PRODUCT β-ACTIVITY COLLECTED BY AIR FILTRATION

December 1959

Disintegrations/minute per cubic meter of air						
Day	Punta Arenas	Puerto Montt	Santiago	Antofagasta	Chacaltaya	Huancayo
1	-	T	0.16	0.11	T	T
2	-	0.16	0.16	0.11	T	T
3	-	0.13	0.19	0.11	T	T
4	-	0.13	0.19	0.11	T	T
5	-	T	0.16	0.14	T	T
6	-	0.11	0.11	0.14	T	T
7	-	T	0.11	0.14	T	T
8	-	T	-	0.14	T	T
9	-	T	0.35	0.14	0.11	T
10	-	T	0.15	0.14	T	T
11	-	0.16	0.15	0.14	T	T
12	-	T	0.06	0.12	T	T
13	-	T	0.06	0.12	0.11	T
14	-	T	0.06	0.12	T	T
15	-	T	0.18	0.11	0.05	T
16	-	0.14	0.18	0.11	0.05	T
17	-	T	0.15	0.12	T	T
18	-	0.11	0.15	0.12	T	T
19	-	T	0.14	0.12	T	T
20	-	0.13	0.14	0.12	T	T
21	-	T	0.14	0.12	T	T
22	-	0.11	0.14	0.12	-	T
23	-	T	0.14	0.12	-	T
24	-	T	0.14	0.18	-	T
25	-	T	0.14	0.18	-	T
26	-	T	0.13	0.12	T	T
27	-	T	0.13	0.12	T	T
28	-	T	0.13	0.12	T	T
29	-	T	0.10	0.05	T	T
30	-	0.13	0.10	0.05	T	T
31	-	T	0.17	0.04	T	T
Mean value	-	0.06	0.14	0.12	0.04	0.03

\- Not received.
T Trace.

TABLE V.—U. S. NAVAL RESEARCH LABORATORY DAILY RECORD OF FISSION PRODUCT β-ACTIVITY COLLECTED BY AIR FILTRATION—Con.

December 1959

Disintegrations/minute per cubic meter of air						
Day	Lima	Iquitos	Guayaquil	Quito	Bogota	Miraflores
1	0.16	T	0.16	T	T	0.11
2	0.16	T	0.16	T	0.09	0.23
3	0.11	T	0.08	T	T	0.11
4	0.16	-	0.08	T	T	0.11
5	0.11	T	0.08	T	T	0.12
6	0.16	T	0.12	T	T	0.12
7	0.11	T	0.12	T	T	0.12
8	0.11	T	T	T	T	0.06
9	T	T	0.11	T	T	0.06
10	0.11	T	0.11	T	T	0.22
11	0.11	T	T	T	T	0.22
12	0.11	T	0.11	T	0.14	0.19
13	T	-	0.08	T	0.11	0.19
14	0.11	T	0.08	T	0.09	0.19
15	0.13	T	0.11	T	-	0.13
16	0.11	T	0.11	T	T	0.13
17	0.13	-	0.16	T	T	0.11
18	T	T	T	T	T	0.11
19	0.11	-	0.11	T	T	0.11
20	0.0	T	0.06	T	T	0.11
21	0.22	T	0.06	T	T	0.11
22	0.22	T	T	T	T	0.18
23	T	T	T	T	T	0.18
24	0.11	T	0.07	T	T	0.11
25	0.16	T	0.07	T	T	0.11
26	-	T	0.07	T	T	0.14
27	0.11	T	0.04	T	T	0.14
28	0.11	T	0.04	T	T	0.14
29	T	T	T	T	T	0.17
30	T	T	T	T	T	0.17
31	T	T	T	T	T	0.06
Mean value	0.10	0.03	0.08	0.03	0.04	0.14

- Not received.
T Trace.

Table V.--U. S. NAVAL RESEARCH LABORATORY DAILY RECORD OF FISSION PRODUCT β-ACTIVITY COLLECTED BY AIR FILTRATION--Con.

December 1959

Disintegrations minute per cubic meter of air						
Day	Miami	Washington	Bedford	Moosonee	Coral Harbour	Thule
1	0.58	0.32	0.21	0.53	0.21	0.30
2	0.55	0.32	0.14	0.18	0.24	0.32
3	0.55	0.37	T	0.16	0.27	0.16
4	0.58	0.37	T	0.21	0.27	0.21
5	0.44	0.25	0.18	0.18	0.35	0.21
6	0.55	0.25	0.28	0.23	0.35	0.23
7	0.46	0.25	0.16	0.28	0.29	0.23
8	0.30	0.18	0.11	0.28	0.29	0.25
9	0.37	0.18	0.25	0.28	0.45	0.37
10	0.69	0.31	0.35	0.30	0.37	0.41
11	0.62	0.31	0.35	0.29	0.24	0.28
12	0.53	0.25	0.15	0.24	0.32	0.32
13	0.28	0.25	0.15	0.27	0.24	0.39
14	0.51	0.25	0.15	0.25	0.35	0.28
15	0.55	0.55	0.35	0.28	0.40	0.23
16	0.55	0.55	0.51	0.32	0.45	0.32
17	0.62	0.38	0.25	0.30	0.48	0.39
18	0.74	0.38	0.25	0.28	T	0.35
19	0.46	0.15	0.15	0.23	0.29	0.30
20	0.55	0.15	0.15	0.25	0.37	0.30
21	0.51	0.15	0.15	0.21	0.29	0.21
22	0.44	0.20	0.23	0.21	0.19	0.25
23	0.44	0.20	0.21	0.09		0.23
24	0.21	0.27	0.30	0.16		0.30
25	0.09	0.27	0.30	0.35		
26	0.16	0.30	0.30	0.30		0.55
27	0.28	0.30	0.30	0.25		0.32
28	0.39	0.30	0.30	0.35		0.32
29	0.23	0.13	0.11	0.28		0.32
30	0.32	0.13	T	0.28		0.55
31	0.30	0.16	T	0.25		0.64
Mean value	0.45	0.27	0.21	0.26	0.31	0.32

- Not received.
T Trace.

FIGURE 2

RADIOACTIVITY PROFILE FOR DECEMBER 1959

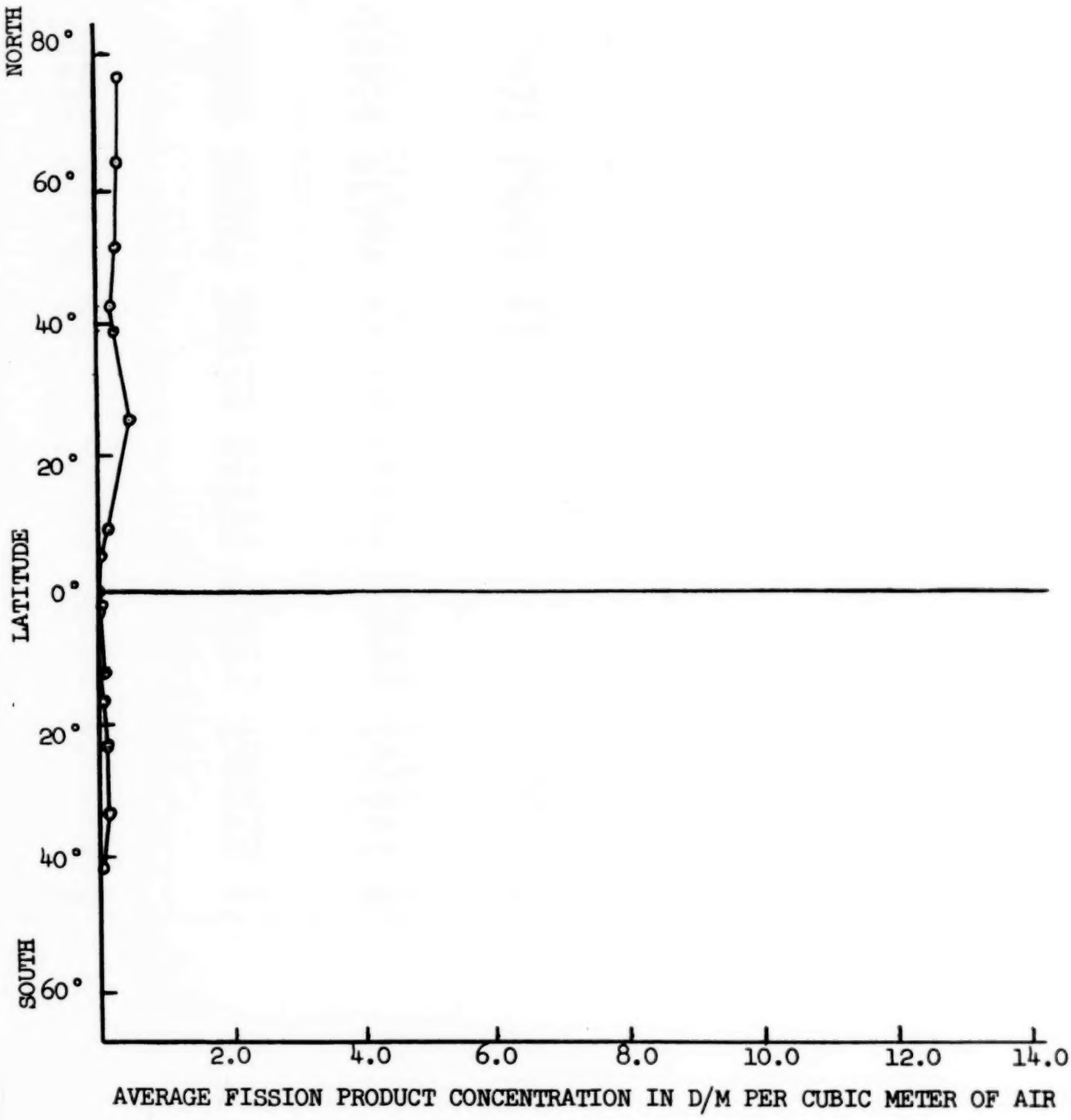


Table VI.--U. S. NAVAL RESEARCH LABORATORY DAILY RECORD OF FISSION PRODUCT β-ACTIVITY COLLECTED BY AIR FILTRATION

January 1960

Disintegrations/minute per cubic meter of air						
Day	Puerto Montt	Santiago	Antofagasta	Chacaltaya	Lima	Guayaquil
1	0.12	0.15	0.06	0.03	0.07	0.06
2	0.12	0.06	0.07	0.01	0.05	0.06
3	0.12	0.06	0.07	0.01	0.02	0.06
4	0.00	0.06	0.07	0.01	0.02	0.06
5	0.14	0.13	0.08	0.00	0.07	0.05
6	0.07	0.13	0.08	0.00	0.05	0.05
7	0.02	0.09	0.09	0.00	0.05	0.07
8	0.05	0.09	0.09	0.00	0.02	0.07
9	0.05	0.07	0.07	0.01	0.02	0.07
10	0.09	0.07	0.07	0.01	0.05	0.06
11	0.09	0.07	0.07	0.01	0.05	0.06
12	0.07	0.05	0.11	0.01	0.03	0.07
13	0.07	0.05	0.11	0.01	0.03	0.05
14	0.14	0.11	-	0.01	0.01	0.09
15	0.14	0.11	-	0.01	0.01	0.07
16	0.05	0.08	-	0.03	0.05	0.09
17	0.05	0.08	-	0.03	0.05	0.07
18	0.05	0.08	-	0.03	0.05	0.07
19	0.10	0.09	-	0.04	0.05	0.07
20	0.10	0.09	-	0.04	0.05	0.07
21	0.15	0.15	-	0.04	0.06	0.05
22	0.15	0.15	-	0.04	0.06	0.05
23	0.09	0.12	-	0.01	0.01	-
24	0.09	0.12	-	0.01	0.01	-
25	0.09	0.12	-	0.03	0.01	-
26	0.09	0.14	-	0.04	0.09	-
27	0.09	0.14	-	0.04	0.09	-
28	0.09	0.16	0.12	0.03	0.07	-
29	0.09	0.16	0.12	0.03	0.07	-
30	-	0.15	0.13	0.01	0.04	-
31	-	0.15	0.13	0.01	0.04	-
Mean value	0.09	0.11	0.09	0.02	0.04	0.06

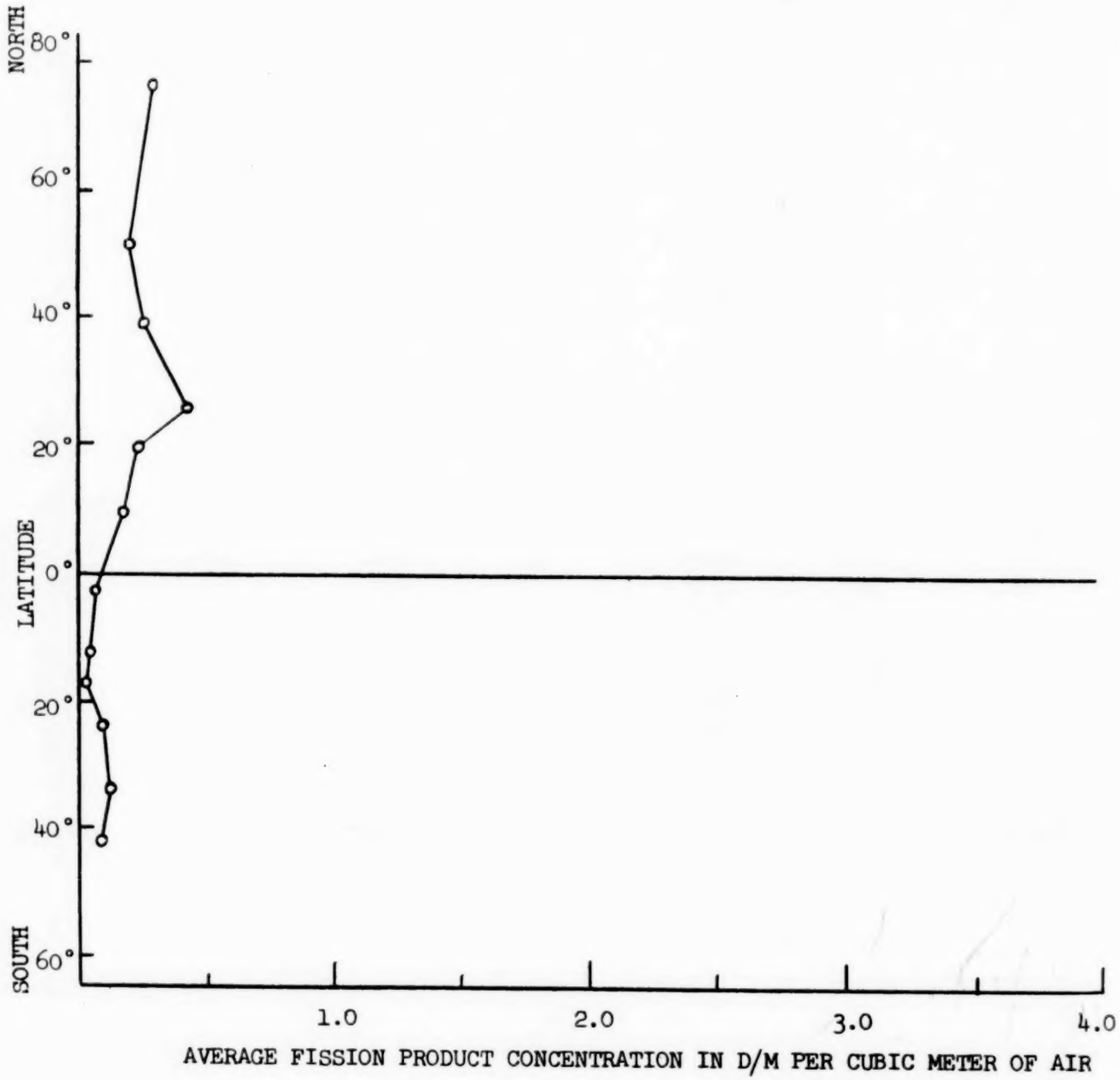
TABLE VI.—U. S. NAVAL RESEARCH LABORATORY DAILY RECORD OF FISSION PRODUCT β-ACTIVITY COLLECTED BY AIR FILTRATION—Con.

January 1960

Disintegrations/minute per cubic meter of air						
Day	Miraflores	Mauna Loa	Miami	Washington	Moosonee	Thule
1	0.06	0.23	0.50	0.16	0.32	0.46
2	0.12	0.14	0.41	0.25	0.30	0.20
3	0.12	0.14	0.41	0.25	0.32	0.20
4	0.12	0.14	0.41	0.25	0.23	0.20
5	0.16	0.36	0.22	0.44	0.21	0.16
6	0.16	0.36	0.22	0.44	0.21	0.16
7	0.16	0.29	0.32	0.33	0.21	0.18
8	0.16	0.29	0.32	0.33	0.21	0.18
9	0.17	0.31	0.32	0.31	0.21	0.23
10	0.17	0.31	0.32	0.31	0.18	0.23
11	0.17	0.31	0.32	0.31	0.14	0.23
12	0.29	0.35	0.46	0.18	0.18	0.14
13	0.29	0.35	0.46	0.18	0.18	0.14
14	0.18	0.13	0.45	0.09	0.21	0.30
15	0.18	0.13	0.45	0.09	0.21	0.30
16	0.14	0.21	0.39	0.25	0.18	0.31
17	0.14	0.21	0.39	0.25	0.30	0.31
18	0.14	0.21	0.39	0.25	0.41	0.31
19	0.14	0.25	0.32	0.17	0.28	0.68
20	0.14	0.25	0.32	0.17	0.23	0.68
21	0.14	0.25	0.47	0.28	0.25	0.41
22	0.14	0.25	0.47	0.28	0.09	0.41
23	0.14	0.38	0.56	0.11	0.05	0.17
24	0.14	0.38	0.56	0.11	0.02	0.17
25	0.14	0.38	0.56	0.11	0.02	0.17
26	0.23	0.15	0.52	0.37	0.14	0.29
27	0.23	0.15	0.52	0.37	0.21	0.29
28	0.20	0.12	0.73	0.23	0.18	0.37
29	0.20	0.12	0.73	0.23	0.21	0.37
30	0.18	0.11	0.29	0.28	0.21	0.30
31	0.18	0.11	0.29	0.28	0.23	0.30
Mean value	0.17	0.24	0.42	0.25	0.20	0.29

FIGURE 3

RADIOACTIVITY PROFILE FOR JANUARY 1960



ARGONNE NATIONAL LABORATORY—ATOMIC ENERGY COMMISSION DATA ON RADIOACTIVITY IN THE AIR AT LEMONT, ILLINOIS*

Air filter measurements of ground level air at Argonne National Laboratory have been reported for September 1959 to January 1960. These measurements show a slow rate of fallout at that location during this period. All fission products including cesium-137 are down to approximately 1/100 of the concentrations observed in March-May, 1959. The concentration of cesium-137 has remained almost constant from October through December and showed a distinct increase of some 60 percent during January. The tracer, rhodium-102, which first became apparent in ground level air in September, has continued to increase through January 1960. The following table indicates the concentration of cesium-137 and rhodium-102 in ground level air from September through January. (Activity is expressed in counts/100 minutes/air filter and the volume of air passing through the filter is on the order of 5,000 cubic meters.)

Table VII

Month	Cesium-137	Rhodium-102
September	608	62
October	333	295
November	360	569
December	312	762
January	500	988

The cesium-137 appearing in January does not appear to be accompanied by much rubidium-106, or cerium-144 which may indicate that the cesium is quite "old."

SUMMARY STATEMENTS ON ENVIRONMENTAL SAMPLING PROGRAMS

As a service to those concerned directly with the many radiation environmental sampling programs, summary statements showing the organization of these programs will be published as soon as completed. The following statement deals with air monitoring similar to the compilation of milk monitoring activities in Radiological Health Data, April 1960. This compilation does not purport to be complete, but does encompass most of the major efforts.

Those in charge of any regularly conducted environmental monitoring programs are encouraged to report both the organizational and administrative aspects of their programs, and the data derived therefrom, for possible inclusion in these monthly reports.

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*Reported to the Atomic Energy Commission by Dr. Philip F. Gustafson, Argonne National Laboratory.

TABLE VIII.—A SELECTED LIST OF ENVIRONMENTAL SAMPLING

Type of sample	Operating agency	Sponsoring agency	Where sampled	Number of stations	Frequency of sampling	Year established
A. Surface Air	PHS Radiation Surveillance Network	AEC	U. S.	44	Daily	1956
B. Surface Air	Naval Research Laboratory	NRL/AEC	80th Meridian	21	Daily	1956
			Misc.	4	Weekly	1957
	Naval Research Laboratory	NRL	U. S. and overseas	7	Daily	1949
C. Surface Air	PHS, National Air Sampling Network	PHS	U. S.	233 (About 162 in operation during any given year)	24 hr. sample taken bi-weekly	1953
D. Surface Air	PHS Off-site	AEC, Nevada Test Site Organization	Nevada	11	Daily	1956
E. Surface Air	U. S. Weather Bureau	AEC	USCG Weather Stations and Commercial Ships	5-10	Four/Year	1958
F. Surface Air (Research)	Air Force Cambridge Research Center	U.S. Air Force	U.S. Air Force Stations	3	Varies with Research Needs	1957
G. Surface Air	PHS	PHS	Cincinnati	1	Daily	1958
Atomic Energy Commission						
H. Surface Air	General Electric Co.	AEC	Cincinnati, Ohio	1	Intermittent	
Surface Air	General Electric Co., Hanford Works	AEC	Hanford Works, Washington	1	Daily	
Surface Air	Sandia Corporation	AEC	Albuquerque, New Mexico	1	Daily except weekends	

NETWORKS FOR ANALYSIS OF RADIOACTIVITY IN AIR

Principal in charge	Gross radiation	Fission products	Tracers	Natural activity	Supplementary analysis
H. J. L. Rechen, Jr.	Beta	---	---	---	---
Dr. L. B. Lockhart, Jr.	Beta	Gross Beta (all stations) Radiochem. (10 stations), (bimonthly) (Sr-89, Sr-90, Y-91, Cs-137, Ce-141, Ce-144)	W-185	Pb-210	
Dr. L. B. Lockhart, Jr.	Beta	Gross Beta	---	RaB, C; ThB, C	---
E. C. Tabor	Beta	---	---	---	Suspended particulate matter, organic pollutants, including metals and nonmetals
O. R. Placak	Beta and Alpha	---	---	---	---
Dr. L. Machta	---	---	---	C-14	CO_2
Dr. E. Martell	Beta	Some for Sr-90, Sr-89	Some for W-185	Some for Pb-210	---
Dr. L. R. Setter	Beta	---	---	Radon-Thoron	---
J. Z. Holland					
H. W. Barkhau et al	Beta-Gamma	---	---	---	---
B. U. Anderson	Beta	---	---	---	---
H. Rarrick	Beta	---	---	---	---

TABLE VIII.—A SELECTED LIST OF ENVIRONMENTAL SAMPLING

Type of sample	Operating agency	Sponsoring agency	Where sampled	Number of stations	Frequency of sampling	Year established
H. Surface Air	Union Carbide Nuclear Co., Oak Ridge Natl. Lab.	AEC	Oak Ridge, Tennessee	1	Weekly	
Surface Air	University of California	AEC	Berkeley Livermore	1 1 (12 sites)	Daily Daily and Weekly	
Surface Air	University of California	AEC	Los Alamos, New Mexico	1	Daily	
Surface Air	University of California	AEC	Los Angeles, California	1	Daily	
Surface Air	University of Chicago	AEC	Lemont, Illionis	1	Daily	
Surface Air	University of Rochester	AEC	Rochester, New York	1	Intermittent	
I. Upper Air "HASP"	SAC, AF Dept. of Defense	Defense Atomic Support Agency (DASA)	70° N to 57° S at 100° W-70° W	U-2 Aircraft	Two missions weekly; 40 samples per mission	1956
J. Upper Air "ASHCAN"	USAF-USWB	AEC	San Angelo, Texas	1	Monthly at several altitudes	1956

NETWORKS FOR ANALYSIS OF RADIOACTIVITY IN AIR—Con.

Principal in charge	Gross radiation	Fission products	Tracers	Natural activity	Supplementary analysis
H. H. Abee and D. M. Davis	Beta	---	---	---	---
N. B. Garden O. L. Meadors	Alpha and Beta-Gamma	---	---	---	---
Dean Meyers & Robert Elliott	Beta	---	---	---	---
Silverman, Romney, Borg, Strebe	Beta	---	---	---	---
J. S. Sedlet	Beta	---	---	---	---
H. Mermagen D. H. Maillie	Beta-Gamma	---	---	---	---
Major Albert K. Stebbins III	Beta	Sr-90, Sr-89; Some for Ba-140, Zr-95, Cs-137, Ce-144, Mo-99, Pu-239	W-185 Rh-102	---	---
J. Z. Holland	Beta	Sr-89, Sr-90, Cs-137, Ce-144, Zr-95, Ba-140	---	H-3 C-14	---

AIR SAMPLING NETWORKS

METHODS OF PUBLICATION OF DATA

A. PHS/AEC Radiation Surveillance Network

PHS Distribution List.

Joint Committee on Atomic Energy Congressional Hearings on Radioactive Fallout, 1957.

"AEC Quarterly Statements on Fallout."

HEW Monthly Reports on Radiological Health Data.

B. U. S. Naval Research Laboratory 80th Meridian Network

NRL Monthly Letter Reports "Fission product radioactivity of the air along the 80th meridian (west)" (1956—continuing).

Radioactivity Data Sheets forwarded monthly to IGY World Data Center, Asheville, N. C. (1958-1959).

NRL Formal Reports and Publications:

L. B. Lockhart, Jr., R. A. Baus, R. L. Patterson, Jr., and A. W. Saunders, Jr., "Radiochemical Analyses of Air Filter Samples Collected During 1958," NRL Report 5390 (October 1959).

L. B. Lockhart, Jr., R. L. Patterson, Jr., and W. L. Anderson, "Measurements of the Air Concentration of Gross Fission Product Radioactivity During the IGY, July 1957-December 1958," NRL Report 5359 (September 1959).

L. B. Lockhart, Jr. and P. King, "Speculations on Atmospheric Processes via Fission Product Levels," American Scientist, Vol. 47 No. 3, 386-396 (September 1959).

L. B. Lockhart, Jr., R. A. Baus, R. L. Patterson, Jr., and A. W. Saunders, Jr., "Contamination of the Air by Radioactivity from the 1958 Nuclear Tests in the Pacific," Science, Vol. 130, No. 3368, 161-162 (July 1959).

L. B. Lockhart, Jr., R. A. Baus, P. King, and I. H. Blifford, Jr., "Atmospheric Radioactivity Studies at the U. S. Naval Research Laboratory," NRL Report 5249 (December 1958). See also Journal of Chemical Education, Vol. 36, No. 6, 291-295 (June 1959).

R. A. Baus, R. L. Patterson, Jr., A. W. Saunders, Jr., and L. B. Lockhart, Jr., "Radiochemical Analyses of Air-Filter Samples Collected During 1957," NRL Report 5239 (December 1958).

L. B. Lockhart, Jr., R. A. Baus, and I. H. Blifford, Jr., "Fission Product Radioactivity in the Air Along the 80th Meridian, January-June 1957," NRL Report 5041 (November 1957). See also Tellus, Vol. XI, No. 1, 83-90 (1959).

L. B. Lockhart, Jr., R. A. Baus and I. H. Blifford, Jr., "Atmospheric Radioactivity Along the 80th Meridian, 1956," NRL Report 4965 (July 1957).

Miscellaneous:

Joint Committee on Atomic Energy, Congressional Hearings on Radioactive Fallout, 1957, 1959.

HASL Fallout Program Quarterly Summary Reports.

U. S. Naval Research Laboratory Air Monitor Network

NRL Formal Reports and Publications:

L. B. Lockhart, Jr., "Atmospheric Radioactivity Levels at Yokosuka, Japan, 1954-1958," NRL Report 5301 (April 1959); see also J. Geophys. Research 64, 1445-1449 (1959).

L. B. Lockhart, Jr., R. A. Baus, P. King and I. H. Blifford, Jr., "Atmospheric Radioactivity Studies at the U. S. Naval Research Laboratory," NRL Report 5249 (December 1958); see also J. Chem. Education 36, 291-5 (1959).

L. B. Lockhart, Jr., R. A. Baus, R. L. Patterson, Jr. and I. H. Blifford, Jr., "Some Measurements of the Radioactivity of the Air During 1957," NRL Report 5208 (October 1958); see also Science 128, 1139 (1958).

R. L. Patterson, Jr., and I. H. Blifford, Jr., "Atmospheric Carbon-14," Science 126, 26-28 (1957).

I. H. Blifford, Jr., H. Friedman, L. B. Lockhart, Jr. and R. A. Baus, "Radioactivity of the Air," NRL Report 4760 (June 1956); see also J. Atm. and Terr. Phys. 9, 1 (1956).

I. H. Blifford, Jr., L. B. Lockhart, Jr., and R. A. Baus, "Relationship Between the Air Concentration of Radioactive Fission Products and Fallout," NRL Report 4607 (November 1955); see also Nature 177, 990-2 (1956) and Science 123, 1120-21 (1955).

I. H. Blifford, Jr., and H. B. Rosenstock, "Fallout Dosages at Washington, D. C.," NRL Report 4654 (November 1955); see also Science 123, 619-622 (1956).

and others.

C. Public Health Service National Air Sampling Network

"Air Pollution Measurements of the National Air Sampling Network," 1953-57, Public Health Service Publication No. 637.

"Particulate Pollutants in the Air of the United States," by C. E. Zimmer, E. C. Tabor and A. C. Stern. Presented at Annual Meeting of Air Pollution Control Association, Los Angeles, Calif., June 1959.

"Distribution of Certain Metals in the Atmosphere of Some American Cities," by E. C. Tabor and W. V. Warren, AMA. Arch. Ind. Health 17:145-151. Feb. 1958.

"Statistical Considerations Related to the Planning and Operation of a National Air Sampling Network," by E. K. Harris and E. C. Tabor. Proc. 49th Annual Meeting, APCA, Buffalo, N. Y., May 1956, pp. 35-1 through 35-18.

"National Air Sampling Network Program Manual for the IBM 650 Computer," by A. C. Stern and C. E. Zimmer, Sanitary Engineering Center 1958.

Congressional Hearings before the Special Subcommittee on Radiation of the Joint Committee on Atomic Energy, U. S. Congress "Fallout From Nuclear Weapons Tests" May 5, 1959, Vol. 1—Summary of Activity From 1953 to 1958, page 173.

National Air Sampling Network Quarterly Reports to Participating Agencies and State Health Departments.

D. PHS Off-Site Air Sampling Network for Communities Near the Nevada Test Site

Atomic Energy Commission's Thirteenth Semi-Annual Report to Congress, p. 117. Superintendent of Documents, Washington, D. C. (1952).

Atomic Energy Commission's Fourteenth Semi-Annual Report to Congress, p. 51. Superintendent of Documents, Washington, D. C. (1953).

Atomic Energy Commission's Eighteenth Semi-Annual Report to Congress, p. 81. Superintendent of Documents, Washington, D. C. (1955).

Atomic Energy Commission's Twenty-third Semi-Annual Report to Congress, p. 28. Superintendent of Documents, Washington, D. C. (1957).

Joint Committee on Atomic Energy Congressional Hearings on Radioactive Fallout 1957 and 1959.

E. United States Weather Bureau Network

Samples currently being analyzed.

F. U. S. Air Force Cambridge Research Center

Periodic Progress Reports, Special Reports and Publications, Request Distribution List.

G. PHS Radon and Thoron Air Studies

"Radiation-Environmental Health Factor," L. R. Setter. Minnesota Medicine, July 1959, Vol. 42, No. 7, pages 892-897.

HEW Monthly Reports on Radiological Health Data.

H. Atomic Energy Commission Installations

"Radioactive Fallout Data," U. S. Atomic Energy Commission, ed. by G. M. Dunning, March 1959.

I. Upper Air—High Altitude Sampling Program (HASP)

Progress Report on the High Altitude Sampling Program by Major Albert K. Stebbins, III, Radiation Division Headquarters, Defense Atomic Support Agency, Washington 25, D. C.

Statement of Dr. Frank H. Shelton before the Joint Committee on Atomic Energy Hearings, "Fallout From Nuclear Weapons Tests," May 6, 1959, Vol. 1, p. 763.

Strontium-90 Content of the Stratosphere by Herbert W. Feely, Isotopes, Inc. Science, 4 March 1960, Vol. 131, No. 3401.

J. Upper Air—"ASHCAN" Studies

"Stratospheric Radioactivity Data Obtained by Balloon Sampling," May 1959 by Joshua Z. Holland, Division of Biology and Medicine, U. S. Atomic Energy Commission. TID-555. Available from Office of Technical Services, Department of Commerce, Washington 25, D. C., $1.50.

AIR SAMPLING NETWORKS

LIST OF SAMPLING STATION LOCATIONS

A. Public Health Service Radiation Surveillance Network

Hartford, Connecticut	Salt Lake City, Utah	Lansing, Michigan
Trenton, New Jersey	Boise, Idaho	Iowa City, Iowa
Harrisburg, Pennsylvania	Anchorage, Alaska	Jefferson City, Missouri
Washington, D. C.	Berkeley, California	Topeka, Kansas
Richmond, Virginia	Honolulu, Hawaii	Oklahoma City, Oklahoma
Atlanta, Georgia	Seattle, Washington	Santa Fe, New Mexico
Columbia, South Carolina	Fairbanks, Alaska	Little Rock, Arkansas
Indianapolis, Indiana	Lawrence, Massachusetts	Denver, Colorado
Cincinnati, Ohio	Providence, Rhode Island	Cheyenne, Wyoming
Minneapolis, Minnesota	Albany, New York	Helena, Montana
Pierre, South Dakota	Baltimore, Maryland	Phoenix, Arizona
New Orleans, Louisiana	Gastonia, North Carolina	Los Angeles, California
Austin, Texas	Jacksonville, Florida	Portland, Oregon
El Paso, Texas	Pascagoula, Mississippi	Juneau, Alaska
Ponca City, Oklahoma	Springfield, Illinois	

B. U. S. Naval Research Laboratory 80th Meridian Air Sampling Network (1959)

Thule, Greenland	San Juan, Puerto Rico	Huancayo, Peru
Coral Harbour, N. W. Terr.	Miraflores, Colombia	Chacaltaya, Bolivia
Moosonee, Ontario	Bogota, Colombia	Antofagasta, Chile
Bedford, Massachusetts	Quito, Ecuador	Porto Alegre, Brazil
Washington, D. C.	Lima, Peru	Santiago, Chile
Columbia, South Carolina	Guayaquil, Ecuador	Puerto Montt, Chile
Miami, Florida	Iquitos, Peru	Punta Arenas, Chile

Miscellaneous NRL/IGY Stations

Drift Station A (now C), Arctic (weekly)	Mauna Loa, Hawaii (weekly)
Pearl Harbor, Hawaii (weekly)	Subic Bay, Philippines (weekly)

U. S. Naval Research Laboratory Air Monitor Network

Washington, D. C.	Wales, Alaska	South Pole (formerly	Chacaltaya, Bolivia
Kodiak, Alaska	Yokosuka, Japan	at Little America)	Lima, Peru

Similar stations operated by cooperating groups at

San Francisco, California (USNRDL)	Rio de Janeiro, Brazil

C. Public Health Service National Air Sampling Network

Station in operation every year	Station in operation during even-numbered years	Station in operation during odd-numbered years
CONNECTICUT		
Hartford	Bridgeport	New Britain
New Haven	Stamford	Waterbury
*Nonurban		
MAINE		
Portland		
Nonurban		
MASSACHUSETTS		
Boston	Springfield	Brockton
*Nonurban	Lawrence	Cambridge
	Lynn	Lowell
	Somerville	New Bedford
	Fall River	Worcester
	Quincy	
NEW HAMPSHIRE		
Manchester		
Nonurban		
RHODE ISLAND		
Providence		
Nonurban		
VERMONT		
Burlington		
Nonurban		
DELAWARE		
Wilmington		
Nonurban		
NEW JERSEY		
Newark	Trenton	Jersey
*Nonurban	Camden	Atlantic
	East Orange	Bayonne
	Elizabeth	Paterson
NEW YORK		
Buffalo	Albany	Schenectady
New York	Rochester	Syracuse
Nonurban	Binghamton	Utica
	Yonkers	Niagara Falls
PENNSYLVANIA		
Philadelphia	Harrisburg	Allentown
Pittsburgh	Reading	Johnstown
Nonurban	Wilkes-Barre	Scranton
	Lancaster	Erie
		York
		Altoona
WASHINGTON, D. C.		
KENTUCKY		
Louisville		
*Nonurban		
MARYLAND		
Baltimore		
Nonurban		
NORTH CAROLINA		
Charlotte	Asheville	Raleigh
Nonurban	Winston-Salem	Greensboro
PUERTO RICO		
San Juan		
Nonurban		

*Temporarily inactivated.

Station in operation every year	Station in operation during even-numbered years	Station in operation during odd-numbered years
VIRGINIA		
Norfolk	Danville	Richmond
Nonurban	Hampton	Roanoke
WEST VIRGINIA		
Charleston	Huntington	Wheeling
*Nonurban		
ALABAMA		
Birmingham	Mobile	Montgomery
*Nonurban		
FLORIDA		
Tampa	Jacksonville	Miami
Nonurban		
GEORGIA		
Atlanta	Columbus	Augusta
*Nonurban	Macon	Savannah
MISSISSIPPI		
Jackson		
Nonurban		
SOUTH CAROLINA		
Columbia	Greenville	Charleston
Nonurban		
TENNESSEE		
Nashville	Memphis	Knoxville
Chattanooga		
*Nonurban		
ILLINOIS		
Chicago	Peoria	E. St. Louis
*Nonurban	Springfield	Rockford
INDIANA		
Indianapolis	Ft. Wayne	Terre Haute
East Chicago	Gary	Hammond
Nonurban	Evansville	South Bend
MICHIGAN		
Detroit	Kalamazoo	Flint
*Nonurban	Lansing	Grand Rapids
	Saginaw	Jackson
OHIO		
Cincinnati	Akron	Toledo
Cleveland	Lorain	Canton
Columbus	Springfield	Hamilton
Dayton		
Youngstown		
*Nonurban		
WISCONSIN		
Milwaukee	Racine	Madison
Nonurban		
IOWA		
Des Moines		Davenport
Nonurban		
KANSAS		
Wichita	Kansas City	Topeka
*Nonurban		
MINNESOTA		
Minneapolis	St. Paul	Duluth
*Nonurban		

*Temporarily inactivated.

Station in operation every year	Station in operation during even-numbered years	Station in operation during odd-numbered years
MISSOURI		
Kansas City		
St. Louis		
Nonurban		
NEBRASKA		
Omaha	Lincoln	
Nonurban		
NORTH DAKOTA		
Bismarck		
Nonurban		
SOUTH DAKOTA		
Sioux Falls		
Nonurban		
ARKANSAS		
Little Rock		
Nonurban		
LOUISIANA		
New Orleans	Baton Rouge	Shreveport
*Nonurban		
NEW MEXICO		
Albuquerque		
Nonurban		
OKLAHOMA		
Tulsa	Oklahoma City	
Nonurban		
TEXAS		
Dallas	Ft. Worth	Austin
Houston	El Paso	Beaumont
San Antonio	Corpus Christi	Galveston
Nonurban	Waco	Texas City
COLORADO		
Denver		
Nonurban		
IDAHO		
Boise		
Nonurban		
MONTANA		
Helena		
Nonurban		
UTAH		
Salt Lake City		
*Nonurban		
WYOMING		
Cheyenne		
Nonurban		
ALASKA		
Anchorage		
Nonurban		
ARIZONA		
Phoenix		
Tucson		
Maricopa County		
Nonurban		
CALIFORNIA		
Los Angeles	Fresno	San Bernardino
San Diego	Oakland	San Jose

*Temporarily inactivated.

Station in operation every year	Station in operation during even-numbered years	Station in operation during odd-numbered years
CALIFORNIA--Con.		
San Francisco	Sacramento	Long Beach
Nonurban	Pasadena	Stockton
	Burbank	Berkeley
	Richmond	Glendale
HAWAII		
Honolulu		
Nonurban		
NEVADA		
Las Vegas		
Nonurban		
OREGON		
Portland		
Nonurban		
WASHINGTON		
Seattle	Tacoma	Spokane
Nonurban		

D. Public Health Service Off-Site Air Sampling Network for Communities Near the Nevada Test Site

Alamo, Nevada	Goldfield, Nevada	Warm Springs, Nevada
Beatty, Nevada	Las Vegas, Nevada	Warm Springs Ranch, Nevada
Caliente, Nevada	Lathrop Wells, Nevada	Watertown, Nevada
Diablo, Nevada	Mercury, Nevada	

E. United States Weather Bureau Air Sampling Stations

These are located on United States Coast Guard Ships at Ocean Weather Stations, and selected commercial ships at other locations.

Station "Bravo"	56° 30'N, 51° 00'W
Station "Charlie"	52° 45'N, 35° 30'W
Station "Delta"	44° 00'N, 41° 00'W
Station "Echo"	35° 00'N, 48° 00'W

F. Air Force Cambridge Research Center Air Sampling Stations

Thule, Greenland	76° N (1958-1959)
Bedford, Mass.	42° N
San Juan, Puerto Rico	18° N (1958-1959)
Iquitos, Peru	3.5° S
Porto Alegre, Brazil	30° S
Puerto Montt, Chile	41° S (1958-1959)

G. Public Health Service Radon and Thoron Air Studies

Cincinnati, Ohio

H. Atomic Energy Commission Installations

General Electric Company:
- Aircraft Nuclear Propulsion Department, Cincinnati, Ohio
- Hanford Works, Washington

Sandia Corporation, Albuquerque, New Mexico

Union Carbon and Carbide:
- Oak Ridge National Laboratory, Tennessee

University of California:
- Berkeley—Livermore
- Los Alamos Scientific Laboratory
- Los Angeles

H. Atomic Energy Commission Installations—Con.

University of Chicago:
Argonne National Laboratory
University of Rochester:
Atomic Energy Project

I. Upper Air—High Altitude Sampling Program (HASP)

Flights operate between 70° N and 57° S at a longitude of 100° W to 70° W.

J. Upper Air—"ASHCAN" Studies

San Angelo, Texas

SECTION III

WATER

PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK

The National Water Quality Network was established under the provisions of Section 4(c) of Public Law 660, which states that "...the Surgeon General shall... collect and disseminate basic data... (relating) to water pollution and the prevention and control thereof."

This Network, operated in cooperation with State and local health agencies, was started in October, 1957. At present there are 61 sampling stations located on major waterways used for public water supply, propagation of fish and wildlife, recreational purposes, and for agricultural, industrial and other uses; some of these stations are interstate, coastal, and International Boundary waters, and waters on which activities of the Federal Government may have an impact. Ultimately a total of 250 to 300 stations will be operated. A few of the more recently established stations have not yet begun to report radioactivity.

Samples of water are examined for chemical, physical, and biological quality insofar as these relate to pollution. Samples for some determinations are taken weekly, others monthly, and for some, continuous composite samples of 10 to 15 days are obtained. Radioactivity determinations are made on single samples, taken weekly.

Gross alpha and beta measurements are made on both suspended and dissolved solids in the raw surface water samples. The radioactivity levels of dissolved solids provide a rough measure of the levels which may be found in a treated water, where such water treatment removes substantially all of the suspended matter. Naturally occurring radioactive substances in the environment are the source of essentially all of the alpha activity. The contamination of the environment from man-made sources is the major contributor to the beta activity. The results are reported in micromicrocuries per liter, and are shown for each station on a given river.

While beta determinations for the first two years of the Network operation have been done on each sample weekly, the alpha determinations are reported generally on a composite sample of more than one week. Beginning with samples taken in January, 1960, beta determinations are to be performed on composite samples obtained by combining two weekly samples. The alpha data will be reported on three-month composite samples, with 1/3 of the stations being covered each month. All the data reported below represent the average of all information available for the month indicated.

Strontium-90 data are reported as being the results of determinations on composite samples for a three-month period ending in the month shown.

Additional information and data may be obtained from the following sources:

1. "National Water Quality Network Annual Compilation of Data," PHS Publication. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $1.50.

2. "Report on National Water Quality Control Network," submitted by Dr. F. J. Weber, Chief, Division of Radiological Health, PHS, to Joint Committee on Atomic Energy Hearings on Fallout from Nuclear Weapons Tests, Vol. 1, May 1959, pages 167-169.

FIGURE 4

FIGURE 4

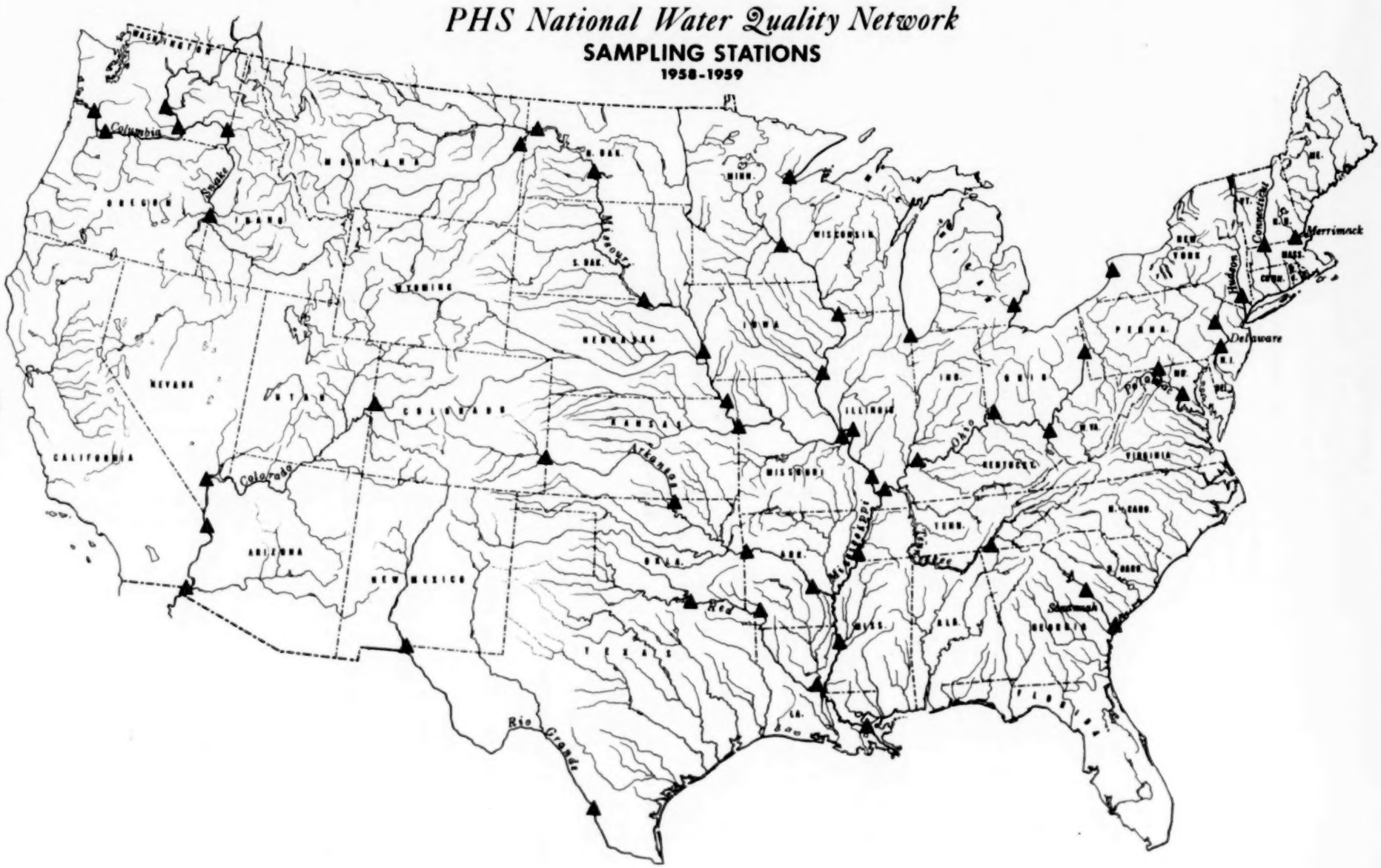
PHS National Water Quality Network
SAMPLING STATIONS
1958-1959
Columbia
Snake
Missouri
Colorado
Arkansas
Red
Rio Grande
Ohio
Hudson
Connecticut
Merrimack
Delaware
Potomac
Savannah
WASHINGTON
OREGON
IDAHO
MONTANA
WYOMING
NEBRASKA
NEVADA
UTAH
COLORADO
KANSAS
CALIFORNIA
ARIZONA
NEW MEXICO
TEXAS
OKLA.
ARK.
MISSOURI
IOWA
MINN.
WISCONSIN
ILLINOIS
MICH.
IND.
OHIO
KENTUCKY
TENN.
MISS.
ALA.
GA.
FLA.
S. CAROL.
N. CAROL.
VIRGINIA
W. VA.
PENNA.
NEW YORK
MD.
DEL.
N.J.
CONN.
R.I.
MASS.
VT.
N.H.
ME.

TABLE IX.—PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK
RADIOACTIVITY IN RAW SURFACE WATERS

(Micromicrocuries per liter)

Station	Quarter ending Sept. 30, 1959	Month of November 1959 (Average to nearest whole number)					
	Strontium-90	Beta activity			Alpha activity		
		Susp.	Dis.	Tot.	Susp.	Dis.	Tot.
ALSEA RIVER							
Alsea, Oreg.	0.2	<1	2	3	-	-	-
ARKANSAS RIVER							
Coolidge, Kans.	1.4	0	24	24	0	32	32
Ponca City, Okla.	0.5	10	0	10	1	3	4
Fort Smith, Ark.	2.1	-	-	-	-	-	-
Pendleton Ferry, Ark.	0.3	29	4	33	34	1	35
CHATTAHOOCHIE RIVER							
Columbus, Ga.	-	0	2	2	0	0	0
COLORADO RIVER							
Loma, Colo.	0.3	67	4	71	21	10	31
Page, Ariz.	-	58	0	58	35	10	45
Hoover Dam, Ariz.-Nev.	0.9	1	6	7	0	9	9
Parker Dam, Ariz.-Calif.	0.6	4	10	14	<1	5	5
Yuma, Ariz.	0.8	10	22	32	0	6	6
COLUMBIA RIVER							
Wenatchee, Wash.	0.5	<1	4	4	0	0	0
Pasco, Wash.	1.0	75	366	441	0	0	0
Bonneville Dam, Oreg.	0.5	23	228	251	0	0	0
Clatskanie, Oreg.	0.5	23	152	175	0	0	0
CONNECTICUT RIVER							
Amherst, Mass.	-	0	0	0	-	-	-
Northfield, Mass.	1.9	0	0	0	1	0	1
DELAWARE RIVER							
Philadelphia, Pa.	0.6	<1	<1	1	1	0	1
GREAT LAKES							
Gary, Ind.	0.4	2	4	6	0	0	0
Duluth, Minn.	0.2	<1	1	2	0	0	0
Detroit, Mich.	0.6	4	3	7	1	1	2
Buffalo, N. Y.	0.8	2	6	8	0	0	0
HUDSON RIVER							
Poughkeepsie, N. Y.	1.0	14	0	14	0	0	0
MERRIMACK RIVER							
Lowell, Mass.	1.2	10	3	13	-	-	-
MISSISSIPPI RIVER							
Red Wing, Minn.	0.5	3	10	13	0	1	1
Dubuque, Iowa	1.6	5	5	10	2	1	3
Burlington, Iowa	1.1	4	3	7	2	1	3
East St. Louis, Ill.	1.2	4	5	9	2	0	2
Cape Girardeau, Mo.	1.2	13	4	17	4	2	6
West Memphis, Ark.	1.3	6	7	13	-	-	-
Delta, La.	1.3	16	9	25	2	2	4
New Orleans, La.	1.0	22	24	46	-	-	-

TABLE IX.—PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK
RADIOACTIVITY IN RAW SURFACE WATERS—Con.

(Micromicrocuries per liter)

Station	Quarter ending Sept. 30, 1959	Month of November 1959 (Average to nearest whole number)					
	Strontium-90	Beta activity			Alpha activity		
		Susp.	Dis.	Tot.	Susp.	Dis.	Tot.
MISSOURI RIVER							
Williston, N. Dak.	0.5	0	0	0	-	-	-
Bismarck, N. Dak.	0.8	1	7	8	0	4	4
Yankton, S. Dak.	0.4	<1	13	14	0	18	18
Omaha, Nebr.	1.1	2	7	9	1	4	5
St. Joseph, Mo.	0.6	19	11	30	11	5	16
Kansas City, Kans.	0.3	26	10	36	8	4	12
St. Louis, Mo.	0.5	8	11	19	1	1	2
OHIO RIVER							
East Liverpool, Ohio	1.2	0	4	4	0	0	0
Huntington, W. Va.	1.0	1	4	5	0	0	0
Cincinnati, Ohio	0.9	7	2	9	-	-	-
Evansville, Ind.	2.0	-	-	-	-	-	-
Cairo, Ill.	1.2	<1	2	3	0	1	1
POTOMAC RIVER							
Williamsport, Md.	0.7	0	2	2	1	0	1
Great Falls, Md.	0.8	3	2	5	0	0	0
RED RIVER							
Denison, Tex.	1.0	<1	17	17	0	1	1
Index, Ark.	0.6	10	2	12	3	4	7
Alexandria, La.	0.4	2	3	5	12	0	12
RIO GRANDE RIVER							
El Paso, Tex.	0.3	-	-	-	-	-	-
Loredo, Tex.	0.2	2	14	16	1	2	3
Brownsville, Tex.	-	0	0	0	0	1	1
ST. MARY'S RIVER							
Sault Ste. Marie, Mich.	-	5	2	7	0	0	0
SAVANNAH RIVER							
North Augusta, S. C.	0.3	<1	2	3	<1	0	<1
Port Wentworth, Ga.	0.7	2	6	8	0	2	2
SNAKE RIVER							
Wawawai, Wash.	0.4	0	2	2	0	1	1
TENNESSEE RIVER							
Chattanooga, Tenn.	3.8	10	16	26	0	0	0
YELLOWSTONE RIVER							
Sidney, Mont.	0.7	<1	6	7	0	9	9

SECTION IV

OTHER DATA

PUBLIC HEALTH SERVICE—ATOMIC ENERGY COMMISSION

Data on Strontium-90 Activity in Human Bones

In cooperation with the Atomic Energy Commission, State Health Departments and local physicians, the Public Health Service has initiated a program of human bone collections and analyses in sections of Nevada, Utah, California, Wyoming, Colorado and Idaho. The data are summarized in Tables X and XI below. Samples were collected between March 1959 and March 1960.

The number of specimens collected to date is too small to permit firm conclusions but comparisons may be made with other similar analyses as reported in the Quarterly Statement on Fallout by the U. S. Atomic Energy Commission January 1960. (Table XII below.) Note that Table XII is based on averages for North America. It would be expected that the average for the United States alone would be at least as great as the averages for North America.

With the above factors in mind the average values for the western States (Table XI) are not significantly different from the average for North America (Table XII). However, many additional samples are needed before more definitive statements may be made.

TABLE X.—ANALYSES OF HUMAN BONE SAMPLES

Sex	Type of bone	Location	Weight (grams)			Radioactivity $\mu\mu$c Sr-90 per gram of—		
			Bones		CaO	Bones		Calcium
			Dry	Ash		Dry	Ash	
	Fetal Specimens:							
F	Rib, sternum, vertebrae	Northern Utah	17.4	4.2	2.34	0.11	0.44	1.1
M	Rib, sternum, vertebrae	Northern Utah	20.0	7.2	4.05	0.06	0.18	0.46
F	Rib, vertebrae, skull	Northern Utah	38.4	13.1	7.27	0.02	0.05	0.13
F	Rib, vertebrae, sternum, cranium	Northern Utah	14.5	5.2	2.80	0.07	0.20	0.54
F	Rib, sternum, vertebrae, calvarium	Northern Utah	39.7	8.9	4.73	0.07	0.31	0.82
M	Rib, vertebrae, cranium	Northern Utah	12.9	1.96		---	background	---
	Newborn (Up to age 1 year):							
F	Rib	Northern Utah	6.2	2.0	1.20	0.60	1.90	4.4
F	Rib	Northern Utah	2.4	0.7	0.40	0.46	1.60	3.8
F	Rib, vertebrae, femur	Northern Utah	20.2	6.4	3.12	0.08	0.26	0.8
F	Rib, vertebrae	Idaho	15.4	3.2			0.76	2.2 (a)
F	Rib, vertebrae	Nevada	4.6	1.4	0.77	0.29	1.35	3.5
M	Rib, vertebrae	Northern Utah	11.2	1.4	0.70	0.15	1.18	3.2
M	Rib, vertebrae	Wyoming	19.4	2.7	1.35	0.12	0.84	2.3
M	Rib, vertebrae, sternum	Northern Utah	9.8	1.7			0.49	1.40 (a)
M	Rib, vertebrae, sternum	Northern Utah	13.0	1.7			0.21	0.62 (a)
M	Rib, vertebrae, sternum	Northern Utah	11.9	3.0	1.60	0.15	0.60	1.63
M	Rib, vertebrae, sternum	Northern Utah	6.3	1.8	0.96	0.05	0.20	0.52
M	Rib, vertebrae, sternum	Northern Utah	19.8	3.3	1.76	0.14	0.83	2.19
M	Rib, vertebrae, sternum	Northern Utah	6.6	1.5	0.80	0.03	0.15	0.40
	Children (Age 1 to 5 years):							
M	Rib, vertebrae	Southern Utah	7.0	3.3	1.84	0.18	0.38	1.1
M	Rib, vertebrae	Southern Utah	5.2	2.5	1.37	0.29	0.64	1.8
M	Rib, vertebrae, sternum	Idaho	43.5	5.6	2.62	0.08	0.64	1.9
F	Rib, vertebrae, sternum	Northern Utah	3.0	1.0	0.56	0.59	1.83	4.6
F	Rib, vertebrae	Northern Utah	31.3	3.0	1.46	0.00	0.01	0.03
M	Vertebrae	Colorado	23.4	2.7	1.43	0.09	0.78	2.09
M	Vertebrae	Northern Utah	16.3	3.15	---	0.03	0.41	1.09

TABLE X.—ANALYSES OF HUMAN BONE SAMPLES—Con.

Sex	Type of bone	Location	Weight (grams)			Radioactivity μμc Sr-90 per gram of—		
			Bones		CaO	Bones		Calcium
			Dry	Ash		Dry	Ash	
	Children (Age 6 to 17 years):							
F	Rib, vertebrae	Northern Utah	16.3	6.3	3.42	0.10	0.26	0.7
M	Rib, vertebrae	Southern Utah	32.4	11.6	6.71	0.14	0.41	1.0
F	Rib, vertebrae, sternum	Northern Utah	25.3	11.7	6.57	0.18	0.39	0.71
F	Vertebrae	Northern Utah	6.1	0.8	0.43	0.07	0.53	1.45
F	Rib	Northern Utah	15.2	8.3	4.90	0.25	0.50	1.1
M	Rib	Northern Utah	9.0	5.1	2.70	0.23	0.40	1.1
M	Rib, vertebrae	Northern Utah	14.7	4.8	2.72	0.21	0.63	1.4
M	Rib, vertebrae	Northern Utah	76.4	22.4	12.10	0.10	0.33	0.8
M	Rib	Southern California	---	4.96	---	---	0.21	0.6 (a)
	Adults (Age 18 or older):							
M	Rib	Northern Utah	10.6	2.4	1.40	0.10	0.50	1.1
M	Iliac crest	California	92.3	46.8	26.80	0.09	0.20	0.6
M	Sternum	California	26.6	5.1	3.00	0.07	0.40	0.9
M	Vertebrae	Northern Utah	68.3	17.3	9.3	0.08	0.30	0.8
M	Rib	Northern Utah	16.2	9.5	5.37	0.13	0.23	0.6
M	Rib	Northern Utah	9.2	5.0	2.82	0.27	0.49	1.4
M	Foot, ankle	Northern Utah	121.7	53.8	30.10	0.00	0.06	0.2
	(Split sample—same as above)		---	20.0	---	---	0.12	0.32 (a)
M	Vertebrae	Northern Utah	45.1	14.4	8.32	0.06	0.27	0.8
M	Rib, vertebrae	Northern Utah	17.8	8.6	4.27	0.05	0.11	0.3
F	Rib, vertebrae	Northern Utah	12.9	5.6	3.17	0.11	0.27	0.7
F	Rib, vertebrae	Southern Utah	34.1	8.4	4.47	0.02	0.09	0.25

(Two additional samples were analyzed (12.0 and 7.6 micromicrocuries of strontium-90 per gram of calcium), but the amounts of the samples were so small that the validity of the results are questionable.)

(a) Analyses by the Health and Safety Laboratory of the Atomic Energy Commission. All other analyses are by the Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio.

TABLE XI.—HUMAN BONE DATA—SUMMARY

(from table X)

Age classification	Number of specimens analyzed	Micromicrocuries strontium-90 per gram of calcium			
		Highest	Lowest	Average	Median
Fetal	6	1.1	~bkgd	~0.51	0.50
Newborn (Up to age 1 year)	13	4.4	0.40	2.07	2.19
Children (Ages 1-5 years)	7	4.6	0.03	1.80	1.8
Children (Ages 6-17 years)	9	1.45	0.6	0.98	1.0
Adults (Age 18 and over)	11	1.4	0.2	0.70	0.7

TABLE XII.—STRONTIUM-90 IN CHILDREN'S BONE SAMPLES COLLECTED JULY 1958-JUNE 1959

(Micromicrocuries of strontium-90 per gram of calcium)

Age group	North America (a)	Age group	North America (a)
Fetus	0.92 (59)	Fetus—Con.	
0-6 months	2.6 (14)	5-6 years	1.3 (3)
7-12 months	1.3 (1)	6-8 years	1.8 (4)
1-2 years	1.9 (3)	8-10 years	1.1 (5)
2-3 years	1.8 (3)	11-15 years	0.91 (15)
3-4 years	1.8 (7)	16-19 years	0.72 (8)
4-5 years	1.9 (5)		

(a) Data as reported to the Atomic Energy Commission by Lamont Geological Laboratory. The numbers of samples included in the averages are shown in parentheses. The data represent averages of samples collected and not necessarily levels which exist throughout the geographical areas shown.

STRONTIUM-90 ANALYSES OF HUMAN AND ANIMAL FOOD COLLECTED IN 1958 AND 1959

Table XIII concerns samples of cabbage, potatoes, soybeans and wheat collected by the Districts of the Food and Drug Administration during 1959 and analyzed for strontium-90 by the Lamont Geological Observatory under a collaborative arrangement. An attempt was made to obtain samples from the same or contiguous counties of the states represented. Many samples represented composites from several local growers. All samples were untreated, i.e., no washing, peeling of outer layers or other preparatory procedures.

Table XIV concerns samples of animal forage collected during 1958 and 1959. Analyses for strontium-90 were made by the Lamont Geological Observatory and by the Washington laboratories of the Food and Drug Administration. In these samples there does not appear to be a relationship between the age of the sample and the percentage of total beta accounted for by strontium.

Table XV concerns samples of fresh vegetables collected during 1958 and 1959. Analyses were made of composites of several samples drawn from each state.

Table XVI concerns samples of fruits collected during 1958 and 1959. With the exception of apples and strawberries all are processed either by canning or dehydration. With one exception, it appears that the fruits generally carry a lower radioactive burden than the vegetables.

Table XVII concerns miscellaneous items discovered in the course of routine surveillance. A strong brew of tea was found to contain about 1/5 of the beta radioactivity from the tea leaves. This was made by allowing about ten times the proportion of tea leaves commonly used for the beverage to steep for three minutes in boiling water.* It should be noted that the values for bread and flour are significantly lower than those noted for wheat in Table XIII. (Editor's note: See further data on wheat, pages 40-43.)

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*Editor's note: Using the largest activity reported for tea (1365 $\mu\mu$c/kg) and assuming (a) two grams of tea per cup, and (b) an extraction factor of 1/5, (assuming strontium-90 is transferred similarly to gross beta) the concentration was calculated as 0.5 micromicrocuries strontium-90 per cup of tea.

TABLE XIII.—STRONTIUM-90 ANALYSES OF FOODS SAMPLED IN 1958 AND 1959 BY THE DISTRICTS OF THE FOOD AND DRUG ADMINISTRATION

Inv. No.	County of origin	Planting date	Harvest date	Micromicrocuries Strontium-90 per Kg product			
				Cabbage	Potatoes	Soybeans	Wheat
	Georgia: Atlanta District:						
72121	Fannin	May '59	July '59	46.78			
72122	Fannin	Apr. '59	Aug. '59		6.15		
57156	Peach	June '59	Nov. 11 '59				
57128	Bartow	Oct. '58	June '59				96.39
	Virginia: Baltimore District:						
59885	Accomack	Aug. '59	Oct. 29, '59	48.03			
59845	Accomack	Feb. '59	June 25, '59		5.81		
59884	Accomack	June '59	Oct. 29, '59			81.47	
59846	Accomack	Oct. '58	June '59				65.54
	New York: Buffalo District:						
65920	Wayne	Mar. '59	Aug. '59	14.86			
65917	Wayne	Apr. '59	Aug. '59		6.88		
65919	Onondaga/Oswego	May '59	Oct. '59			9.16	
65918	Wayne	Sept. '58	Aug. '59				58.87
	Ohio: Cincinnati District:						
17055	Clinton	Apr./May '59	July '59	8.15			
17054	Clinton	Apr. '59	July '59		8.25		
17773	Clinton	May 1-15, '59	Oct. 15, '59				
70903	Clinton	Oct. '58	June/July '59				30.74
	Colorado: Denver District:						
91801	Weld	May 12, '59	Oct. 8, '59	9.63			
83908	Weld	May 1, '59	Aug. 28, '59		2.21		
64981	Larimer	May 30, '58	Sept. 29, '58			8.76	
64971	Larimer	May 12, '59	Oct. 10, '59			12.80	
64930	Sedwich/Phillips	Sept. '58	July 8, '59				68.03
	Michigan: Detroit District:						
79421	Lapeer/St. Clair	July '59	Oct. 14, '59	8.7			
79738	Bay	Apr. '59	July-Sept. '59		1.115		
77662	Monroe	May '59	Nov. 1, '59				
77581	Monroe	Sept. '58	July '59				31.41
	Kansas: Kansas City District:						
55555	Johnson	Apr. '59	June 11, '59	7.25			
55556	Johnson	Mar. '59	July '59		3.74		
82810	Wilson	May '59	Sept. '59				
55909	Leavenworth	June '59	Sept. '59			44.97	
55953	Johnson	Aug. '58	June/July '59				42.38
	Minnesota: Minneapolis District:						
27259	Hennepin/Scott	Apr./May '59	July 17, '59	9.97			
27268	Sherborne	Apr. '59	July 31, '59		2.46		
27296	Scott/Sibley	May/June '59	Oct. 21, '59			23.62	
27267	Carver	Apr. '59	July '59				23.17

TABLE XIII.—STRONTIUM-90 ANALYSES OF FOODS SAMPLED IN 1958 AND 1959 BY THE DISTRICTS OF THE FOOD AND DRUG ADMINISTRATION—Con.

Inv. No.	County of origin	Planting date	Harvest date	Micromicrocuries Strontium-90 per Kg product			
				Cabbage	Potatoes	Soybeans	Wheat
	Texas: New Orleans District:						
28535	Zavala	Aug. 15, '59	Nov. 10, '59				
29189	Crosby	Feb. '59	July '59		3.57		
91926	Hale	June '59	Nov. 5, '59			18.76	
29190	Taylor/Callahan	Nov. '59	June '59				37.40
	Illinois: St. Louis District:						
54399	Madison	Apr. '59	July '59	15.45			
54398	Madison	Mar. '59	July '59		2.05		
54397	Madison	May '59	Sept. 21, '59				
54400	Montgomery	Aug. '58	July '59				42.26
	California: San Francisco District:						
40624	Monterey	May '59	July 23, '59	2.119			
48659	San Joaquin	Mar. '59	July 15, '59		0.79		
48948	Placer	Nov. '58	July '59				9.04
	Idaho and Washington: Seattle District:						
77326	Ada/Canyon	June 1, '59	Oct. 15, '59	21.19			
60417	Canyon	Apr. 10, '59	Sept. 24, '59		1.66		
76713	Walla Walla	Feb. '59	July '59				12.96

TABLE XIV.—FOOD AND DRUG ADMINISTRATION
STRONTIUM-90 ANALYSES OF ANIMAL FORAGE COLLECTED DURING 1958 AND 1959

Animal fodder	Source		Date collected	Strontium-90 content μμc/kg	Total beta content μμc/kg*	Date analyzed	Sr-90/total beta (expressed as a percent)
	State	County					
Alfalfa	Nebr.	Odessa	8-12-58	138	3150	2-9-59	4.4
"	Minn.		8-13-58	806	13500	6-2-59	6.4
"	S. Dak.	S. Shore	7-16-58	797	18000	6-2-59	4.4
"	Md.		1-30-59	600	6700	6-2-59	9.0
"	Ind.	Wabash	8-5-58	1168	9500	6-2-59	12
"	Ariz.	Yuma	1-8-59	122	730	6-2-59	17
"	Mo.		5-8-59	188	19350	10-14-59	0.97
"	Ga.	Rockdale	9-23-59	1473	9897	11-6-59	15
"	N. C.	Cabarrus	9-11-59	1109	6934	11-6-59	16
"	N. C.	Buncumb	10-5-59	518	5895	11-6-59	8.8
"	Colo.		5-26-59	299	46869	10-14-59	0.63
"	Colo.		5-16-59	18	45194	10-14-59	0.03
"	N. Mex.		5-20-59	360	54811	10-14-59	0.65
Lespedeza	Ga.	Monroe	9-24-59	1321	7942	11-6-59	17
"	S. C.	Greenville	9-15-59	1698	9191	11-6-59	18
Pea vines	S. C.	Colleton	9-20-59	4628	15804	11-6-59	29
Pangolo	Fla.	Pinelles	9-16-59	537	8792	11-6-59	6.1
Timothy	Fla.	Hillsborough	9-16-59	671	10946	11-6-59	6.1

*Corrected for potassium-40.

TABLE XV.—FOOD AND DRUG ADMINISTRATION—STRONTIUM-90 ANALYSES OF SEVERAL VARIETIES OF FRESH VEGETABLES COLLECTED DURING 1958 AND 1959

Vegetable	Source	Date collected	Strontium-90 content $\mu\mu$c/kg
Spinach	Maryland	4-9-59	388
"	Virginia	3-6-59	461
"	Arkansas	2-15-59	438
"	"	4-24-59	205
"	"	4-24-59	246
"	Illinois	3-6-59	91
"	Arizona	6-12-59	21
"	California	4-12-59	83
Snap beans	Missouri	4-24-58	55
" "	New Jersey	4-24-58	56
" "	Illinois	4-24-58	40
" "	Tennessee	6-30-59	41
Cabbage	Arizona	2-15-59	6
"	California	2-15-59	31
"	Illinois	1958	18
"	Indiana	1958	27
Lettuce	California	11-3-58	5.4
"	"	11-20-58	14.3
"	"	2-9-59	60
"	New Mexico	1959	10
Celery	California	11-3-58	3.4
"	"	11-20-58	3.9
Peas	Minnesota	1958	8
Mustard greens	Tennessee	5-5-59	233
Parsley	California	3-6-59	71
"	"	6-15-59	26

TABLE XVI.—FOOD AND DRUG ADMINISTRATION—STRONTIUM-90 ANALYSES OF SEVERAL VARIETIES OF FRUITS COLLECTED DURING 1958 AND 1959

Fruit	Source	Date collected	Strontium-90 content $\mu\mu$c/kg
Apple	New York	1959	4.4
"	"	1959	6.9
"	"	1959	3.5
"	"	1959	3.1
"	"	1959	3.5
Canned peaches	California	1959	0.47
" "	"	1959	2.6
" "	"	1959	3.5
" "	"	1959	2.0
" "	"	1959	117
Dried apricots	California	1959	17
Raisins	California	1959	4.4
"	"	1958	11.3
Dates	Iraq	1958	7
"	"	1958	10
"	"	1958	6
"	"	1958	5
Figs	Greece	1958	13
"	Portugal	1958	11
"	"	1958	15
"	"	1958	10
Fresh strawberries	Composited California and Arkansas	5-12-59	24

TABLE XVII.--FOOD AND DRUG ADMINISTRATION--STRONTIUM-90 ANALYSES OF MISCELLANEOUS FOOD ITEMS COLLECTED DURING 1958 AND 1959

Product	Source	Date collected	Strontium-90 content $\mu\mu$c/kg
Flour	Minnesota	4-9-59	7
Fresh bread	"	4-29-59	13
Eggs	"	4-8-59	6
Egg shells	"	4-8-59	247
Cheese	Illinois	5-1-59	63
Dried skim milk	Utah	5-11-59	86
Cocoa	"	5-27-59	41
Tea	India	1958	387
"	"	10-25-59	764
"	"	10-25-59	1365
"	"	10-25-59	1132
"	"	10-25-59	1085
"	Japan	8-13-58	264
Thyme	Spain	1958	1038
Tuna fish (white meat)	"	1959	8
Tuna fish (white meat)	Japan	12-10-58	0.81
Tuna fish (dark meat)	"	12-10-58	0.36
Tuna fish (vertebra)	"	12-10-58	40

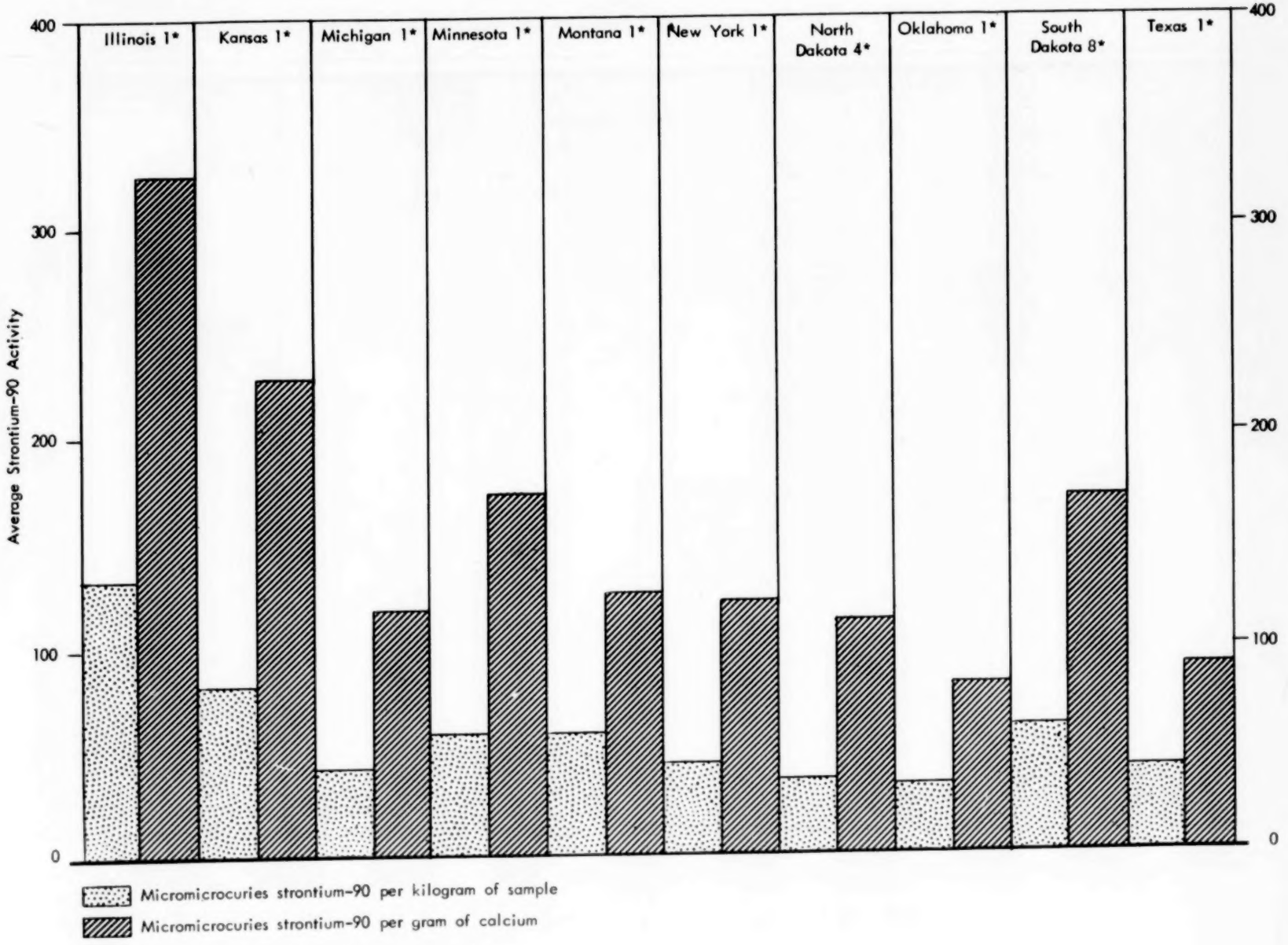
ATOMIC ENERGY COMMISSION DATA ON WHEAT

The following figures 5, 6, and 7 concerning strontium-90 activity in wheat are based on data contained in the Atomic Energy Commission's Health and Safety Laboratory Report, HASL-84.

FIGURE 5

FIGURE 5

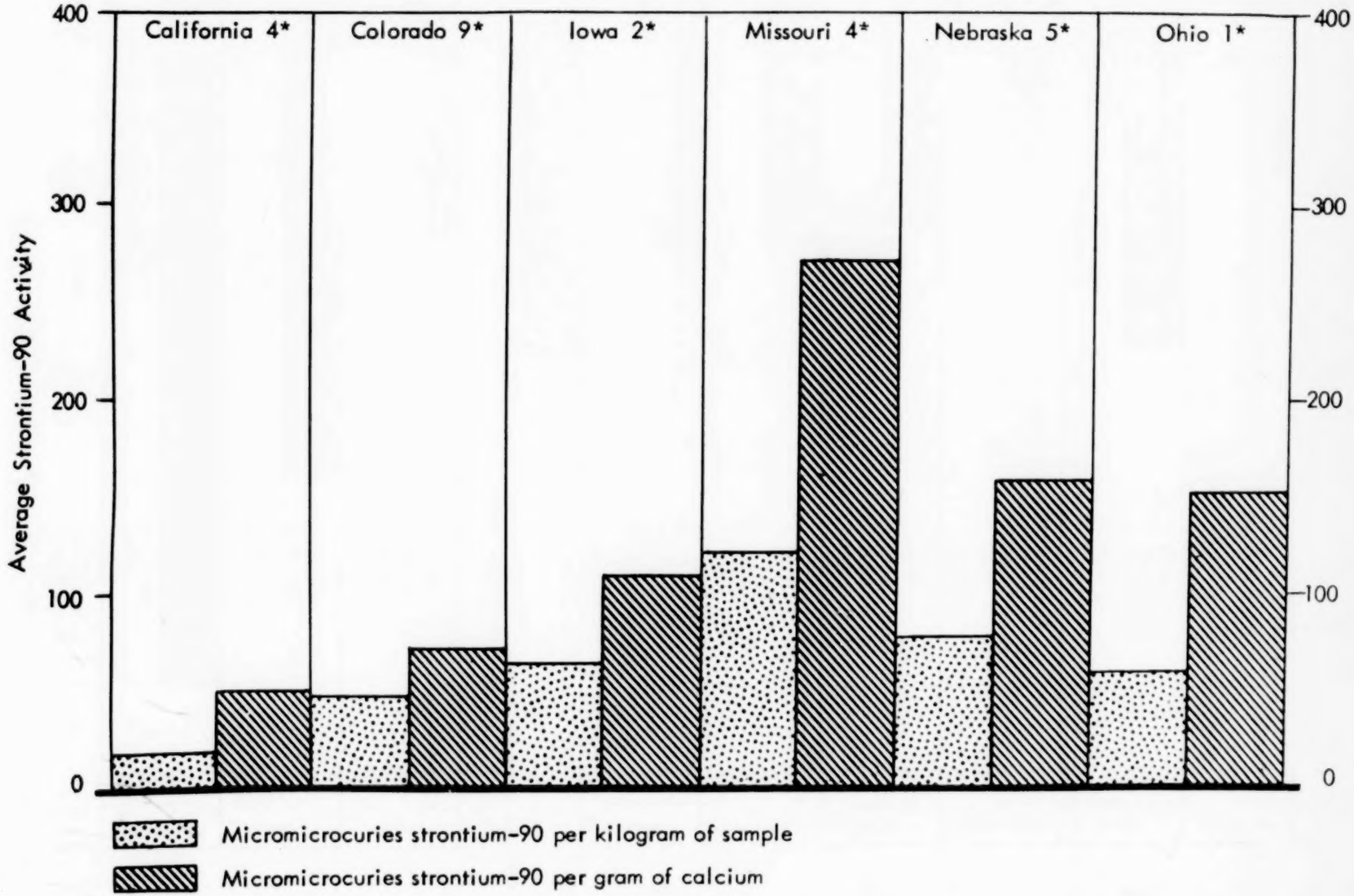
AVERAGE STRONTIUM - 90 ACTIVITY IN WHOLE WHEAT
1958



* The numeral represents the number of composite samples

FIGURE 6

AVERAGE STRONTIUM-90 ACTIVITY IN WHOLE WHEAT
1959



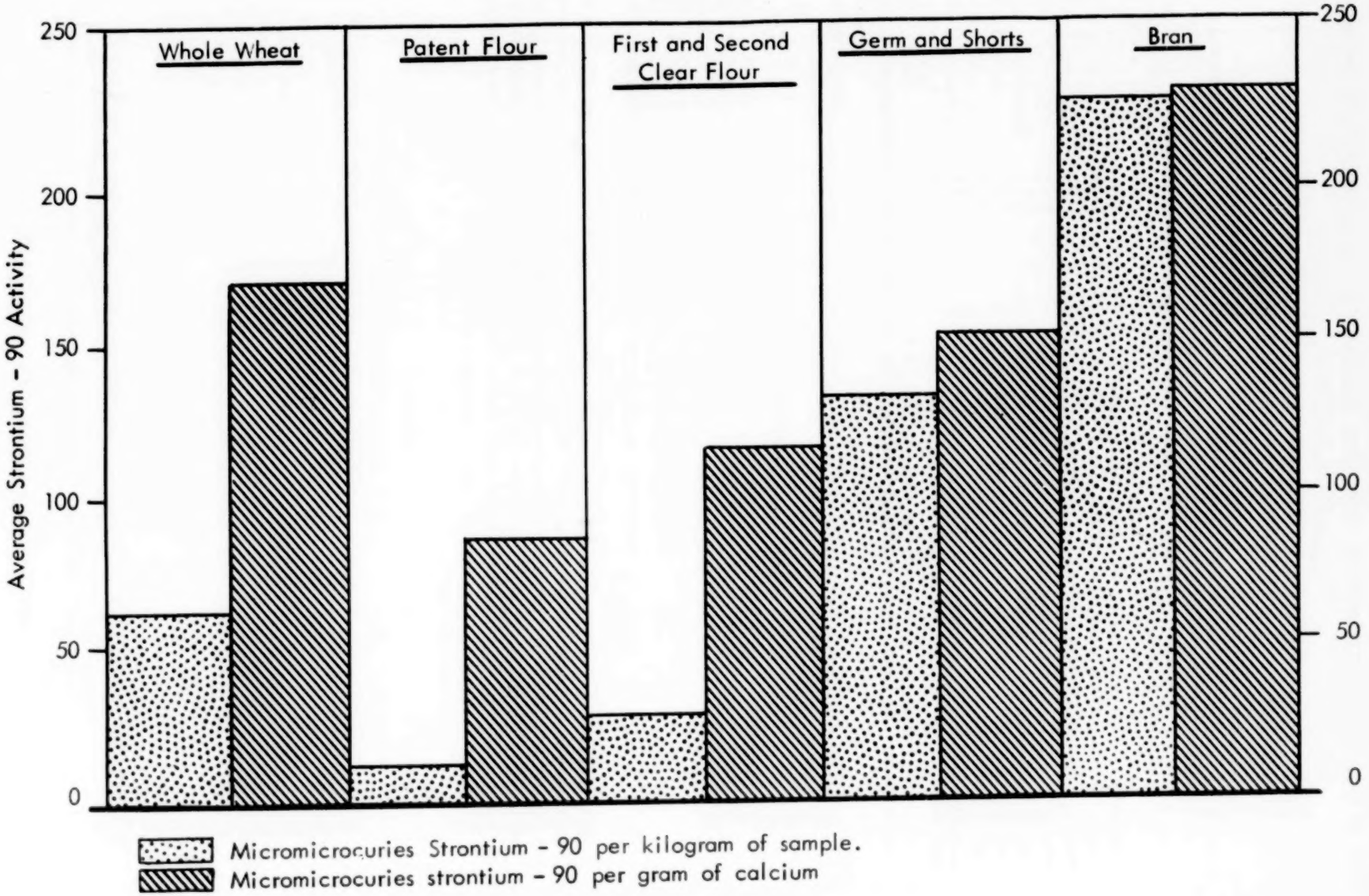
* The numeral represents the number of composite samples.

FIGURE 7

FIGURE 7

AVERAGE STRONTIUM - 90 ACTIVITY IN WHOLE WHEAT AND MILLING PRODUCTS*

1958



* Weighted according to 1958 production for nine states: Illinois, Kansas, Michigan, Minnesota, Montana, New York, North Dakota, Oklahoma and Texas.

TABLE XVIII.--STRONTIUM-90 IN MONTHLY COMPOSITED NEW YORK CITY BREAD SAMPLES*

(Strontium-90 in micromicrocuries)

1959	Per kilogram			
	Whole wheat bread		White bread	
	Grams calcium	Strontium-90	Grams calcium	Strontium-90
February	1.74	128	1.94	10
April	0.97	59	1.96	12
May	0.86	37	1.22	12
June	0.94	29	1.21	13
July	0.69	27	0.72	13
August	0.91	52	0.90	12
September	0.90	24	0.94	16
October	0.82	26	0.94	12
November	0.78	56	0.88	11

*Reported by the Health and Safety Laboratory, U. S. Atomic Energy Commission.

EXTERNAL GAMMA ACTIVITY

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

Portable survey instruments are available at the stations of the Radiation Surveillance Network and one of their uses is to record external gamma radiation. These readings are not precise, especially for measurement of low levels but they can show the presence or absence of any significant increases above background. The differences among the values shown on the following table are within the variances anticipated due to differences in normal background and in instrument response characteristics.

TABLE XIX.--EXTERNAL GAMMA ACTIVITY
PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

Milliroentgens per hour—at three feet above the ground
For month of December 1959

Station location	Average	Station location	Average
Alaska, Anchorage	0.01	Minnesota, Minneapolis	0.02
Alaska, Fairbanks	0.01	Mississippi, Pascagoula	(*)
Alaska, Juneau	0.02	Missouri, Jefferson City	0.01
Arizona, Phoenix	0.02	Montana, Helena	0.03
Arkansas, Little Rock	0.02	New Jersey, Trenton	0.02
California, Berkeley	0.01	New Mexico, Santa Fe	0.04
California, Los Angeles	0.01	New York, Albany	0.02
Colorado, Denver	0.02	North Carolina, Gastonia	0.02
Connecticut, Hartford	0.02	Ohio, Cincinnati	(*)
District of Columbia	0.02	Oklahoma, Oklahoma City	0.02
Florida, Jacksonville	0.02	Oklahoma, Ponca City	0.04
Georgia, Atlanta	0.02	Oregon, Portland	0.02
Hawaii, Honolulu	0.02	Pennsylvania, Harrisburg	(*)
Idaho, Boise	(*)	Rhode Island, Providence	0.02
Illinois, Springfield	(*)	South Carolina, Columbia	0.02
Indiana, Indianapolis	0.01	South Dakota, Pierre	0.02
Iowa, Iowa City	0.01	Texas, Austin	0.01
Kansas, Topeka	0.02	Texas, El Paso	0.02
Louisiana, New Orleans	0.01	Utah, Salt Lake City	0.02
Maryland, Baltimore	0.02	Virginia, Richmond	0.01
Massachusetts, Lawrence	0.01	Washington, Seattle	0.02
Michigan, Lansing	0.02	Wyoming, Cheyenne	0.02

* No data received.

TABLE XX.—FISSION PRODUCT RADIOACTIVITY IN SOIL AT ARGONNE NATIONAL LABORATORY, ATOMIC ENERGY COMMISSION *

(In millicuries per square mile)

Isotope	December 29, 1959	February 2, 1960
Zirconium-95—Niobium-95	200	150
Cesium-137	186	198
Rubidium-106	1,010	989
Rubidium-103	---	---
Cerium-141	---	---
Cerium-144	1,720	1,590
Totals	3,332	3,077
Dose (μ rad/hr)**	2.95	2.58

*As reported to the U. S. Atomic Energy Commission by Dr. Phillip F. Gustafson, Argonne National Laboratory.

**Editor's note: These calculated values are based on the theoretical considerations that if all of these radioisotopes found in depth within the soil were placed in an infinitely flat plane, then the indicated dose rates would result at a height of three feet above that plane.

SECTION V

ABSTRACTS

A limited number of abstracts of pertinent reports will be published in the Radiological Health Data monthly and quarterly reports. Authors are invited to submit such abstracts.

RADIONUCLIDE ANALYSIS OF CINCINNATI AIR

Krieger, H. L. and Velten, R. J.

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

The radionuclide content of a composite specimen of Cincinnati surface air particulates collected during the period February-June 1959, was determined. The greater part of the activity was due to cerium-141/144, zirconium-95, and ruthenium-103/106. Lesser amounts of activity were contributed by other fission products and by cobalt-60 and zinc-65. The dose rate resulting from this airborne activity is small in comparison to dose from foodstuffs and other exposures.

DETERMINATION OF IODINE-131, CESIUM-137, AND BARIUM-140 IN FLUID MILK BY GAMMA SPECTROSCOPY

Hagee, G. R., Karches, G. J. and Goldin, A. S.

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

The radionuclides Iodine-131, Cesium-137, and Barium-140 are determined in fluid milk by multi-channel gamma spectroscopy, using a heavily shielded 4" x 4" sodium iodide (thallium-activated) crystal as a detector. The contribution of each of the above nuclides, and also of the naturally occurring K^{40}, to the composite gamma spectrum is evaluated by solving a set of simultaneous equations describing their mutual interferences. No sample preparation is required for the analysis.

The sensitivity of the method is about 10 $\mu\mu$c/liter, with a precision and accuracy of about 5-10 $\mu\mu$c/liter when the nuclides are present at levels up to about 50-100 $\mu\mu$c/liter. At higher levels, the precision and accuracy are about 5-10 percent.

SIMPLIFIED DETERMINATION OF STRONTIUM-90

Velten, R. J. and Goldin, A. S.

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

A simplified approximate method for the determination of strontium-90, particularly applicable for screening purposes, is based on the preferential extraction of yttrium-90 by tributyl phosphate from strong nitric acid solution. The radioactive interferences, namely the rare earths and zirconium-niobium, and the effects of calcium and of phosphates are discussed. In many cases, where alkaline earth activities are relatively enriched, useful preliminary results may be obtained in one day. These results may be readily improved in a few additional days by correcting for impurities on the basis of decay measurements.

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